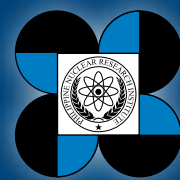


PNRI

Annual Report

2005

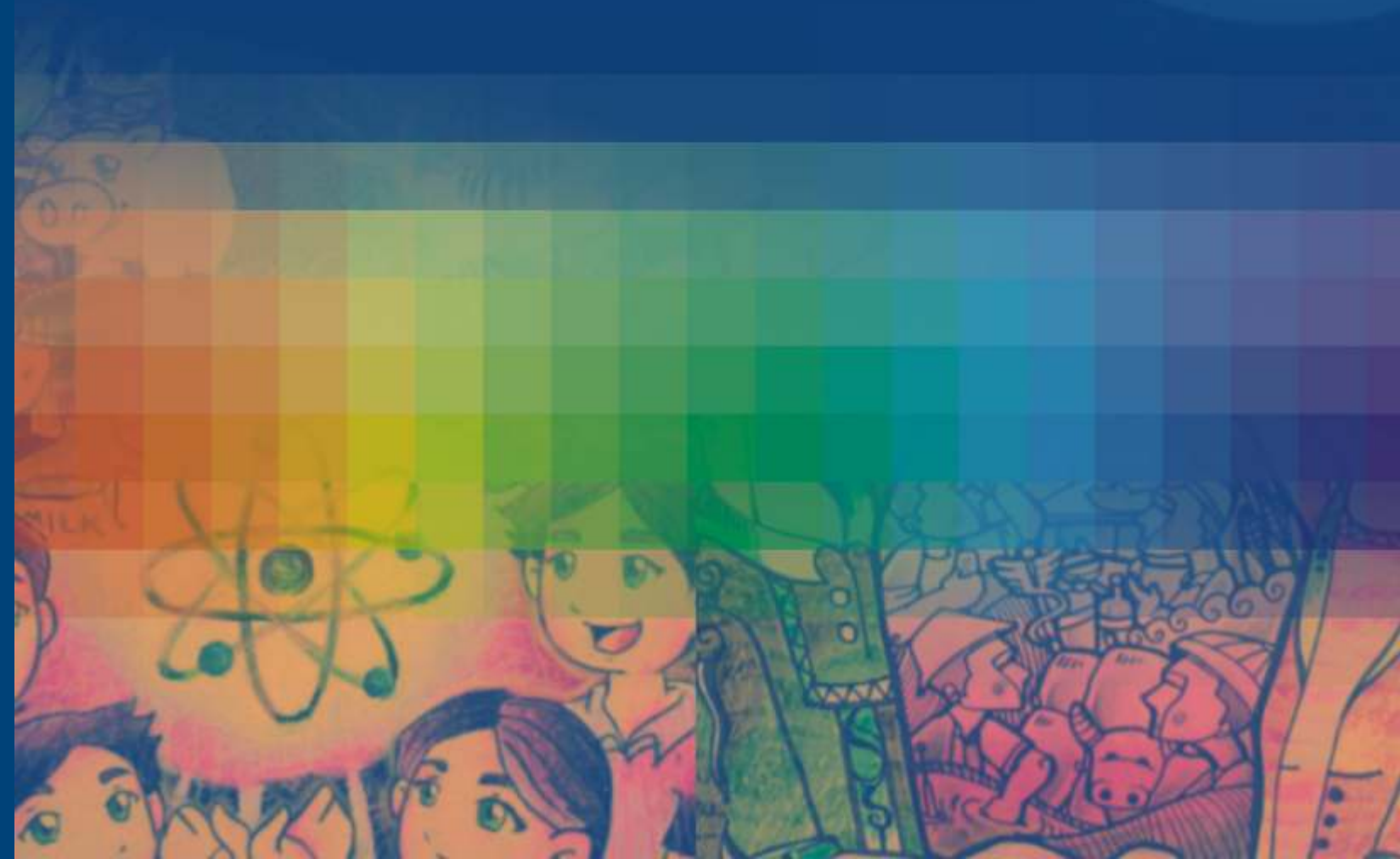
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE NUCLEAR RESEARCH INSTITUTE



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PHILIPPINE NUCLEAR RESEARCH INSTITUTE

Commonwealth Avenue, Diliman, Quezon City
Tel: (632) 929 6010 to 19 (connecting all units)
Fax: (632) 920-1646

Website: www.pnri.dost.gov.ph



PNRI Annual Report 2005

ABOUT US

The Philippine Nuclear Research Institute (PNRI), formerly the Philippine Atomic Energy Commission, has been the center of nuclear science and technology activities in the country since 1958. The PNRI is mandated to develop and regulate the safe and peaceful uses of nuclear science and technology in the Philippines.

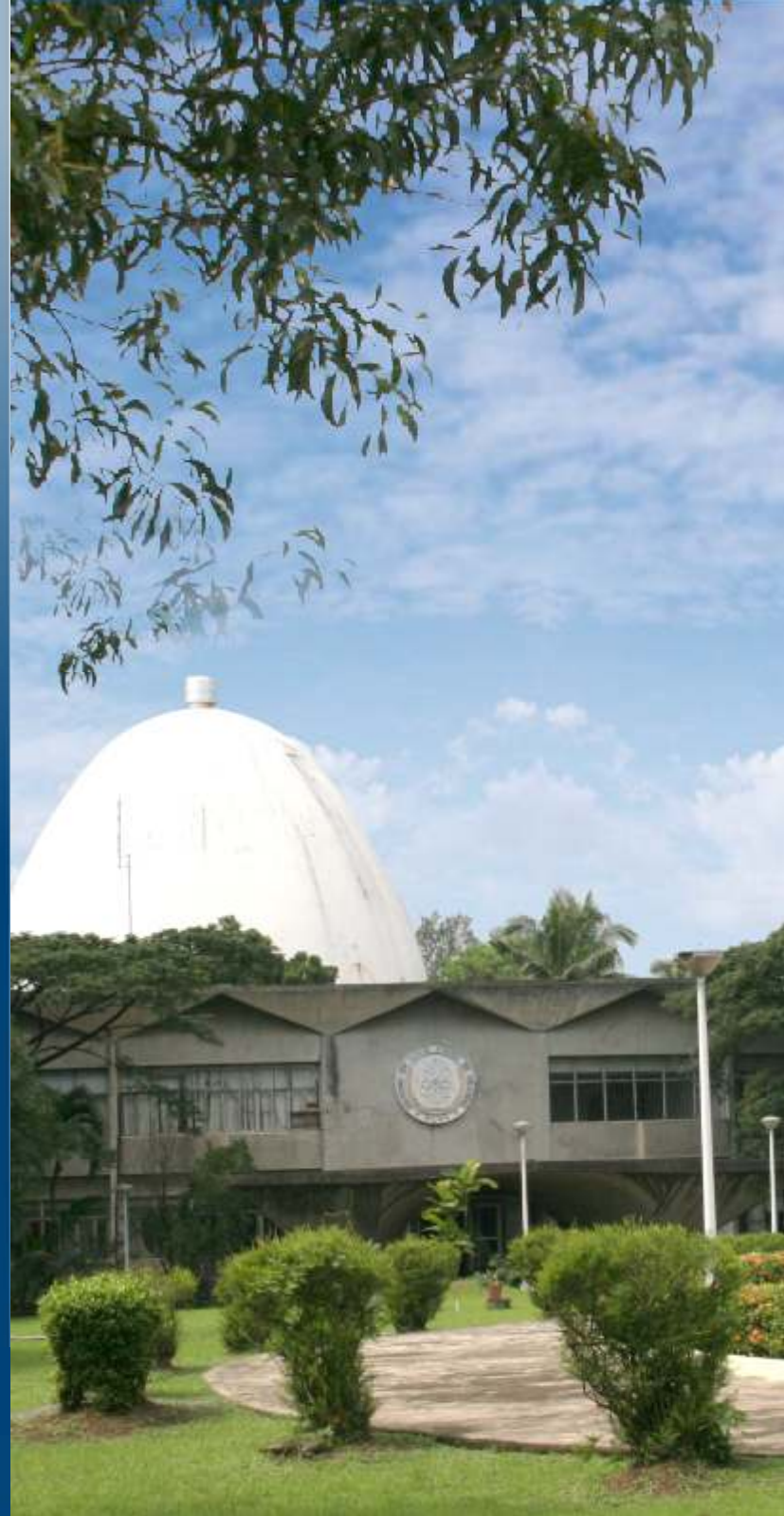
OUR MISSION

"We contribute to the improvement of the quality of Filipino life through the highest standards of nuclear research and development, specialized nuclear services, nuclear technology transfer and effective and efficient implementation of nuclear safety practices and regulations."

OUR VISION

The PNRI is an institution of excellence in nuclear science and technology propelled by a dynamic and committed workforce in the mainstream of national development.

The 2005 Annual Report features the winners of the On-the-Spot Poster Making Contest for high school students which was one of the highlights of the Atomic Energy Week celebration on December 5 to 9, 2005. The theme of the contest was "Sustainability Through Nuclear Science and Technology".



Message From the Director

It is with great pride that I present the accomplishments of the Philippine Nuclear Research Institute (PNRI) for the year 2005.

2005 has been a banner year for PNRI in the pursuit of its vision of excellence for the organization and staff, and of being in the mainstream of national development. The Annual Report documents the important accomplishments under the three pillars of our mandate, namely, R & D, technology transfer and nuclear services, and nuclear regulation, licensing, safeguards and security. I would like to highlight the following milestones.

The PNRI is undertaking a pioneering research to understand the uptake and fate of saxitoxin in mussel, using radioisotopes and nuclear techniques, that may lead to science-based risk management strategies and mitigation measures. In recognition of the R & D work of PNRI on harmful algal blooms, the International Atomic Energy Agency (IAEA) has designated the PNRI as a Collaborating Center. PNRI, thus, holds the distinction of being one of only six IAEA Collaborating Centers in the world.

Upon its ratification of the Comprehensive Nuclear Test Ban Treaty (CTBT) in 2001, the Philippines is committed to host two auxiliary seismic stations and one radionuclide station. With the completion and certification of the PHP 52 radionuclide monitoring station, the Philippine Government has fulfilled the first phase of its commitment to the CTBT. The Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) certified and turned over the PHP 52 station to PNRI in December 2005. Together with the two auxiliary seismic stations, it is now connected and part of the International Monitoring System that monitors any nuclear testing activity in the world.

PNRI continues to enhance its radiological safety policy on its own activities and the activities of its licensees. The adoption of the International Basic Safety Standards (IBSS) and the IAEA Code of Conduct on the Safety and Security of Radioactive Materials in the PNRI Regulations ensures adherence to international standards and best practices. On nuclear security matters, the PNRI has been an active member of the Anti Terrorism Task Force. In close coordination with the national intelligence and security agencies, the PNRI has formulated a national strategy for the security of nuclear and radioactive materials.

The Annual Report embodies the dedication and invaluable contribution of every PNRI staff. I wish to thank you all for your hard work and commitment to the Institute.

On behalf of the Institute, I wish to express our appreciation and gratitude to the Department of Science and Technology, to our international collaborators as well as our national collaborators and stakeholders for their faith and confidence in us, and their support in helping us make nuclear science and technology work for the benefit of the country and the Filipino people.




Alumanda M. Dela Rosa, Ph.D.
Director

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Diffusion of Knowledge & Technologies

2005 AEW On-the-Spot
Poster Making Contest
1st Place
Rollie Florano, Jr.
Bagong Silangan High School
Quezon City



Nuclear S & T Training

The PNRI conducts various training courses geared towards the continuous development of manpower in the field of nuclear science and technology. For 2005, the Institute's Nuclear Training Center conducted 30 training courses for 388 participants from different private and government institutions. These courses include: eight courses on radiation safety, two on radioisotope techniques, one on nuclear science for high school science teachers, one on radioimmunoassay and 18 on nondestructive testing (NDT). The NDT courses were conducted in cooperation with the Philippine Society for Nondestructive Testing. This year, the International Atomic Energy Agency provided the PNRI with the following equipment for use in the conduct of NDT courses: X-ray unit, a gamma projector, and an ultrasonic flaw detector.

The PNRI also provided on-the-job training in different PNRI research facilities for 53 undergraduate students from 12 colleges/universities; and thesis advisorship for eight students from four colleges/universities. (See Table on page 3).



Nuclear training course participants perform a laboratory experiment using Geiger Mueller counters at the PNRI Nuclear Training Center.

Information Services

The PNRI continuously informs and educates various groups on nuclear science and technology and its beneficial applications through several strategies. For 2005, around 21,000 copies of brochures/flyers/annual reports were distributed to more than 11,000 clients. A total of 7,088 visitors from 94 schools/agencies came to PNRI for educational tours of its laboratories and facilities. PNRI also provided information assistance to 324 walk-in visitors and addressed nuclear S & T related inquiries of 253 individuals by phone and via the

PNRI webmail (info@pnri.dost.gov.ph). The following print and non-print information materials were also developed/ produced: (1) nine flyers/brochures on PNRI technologies, (2) exhibit materials for the 16th DOST Annual Technology Fair at the Philippine Trade and Training Center in July, (3) a video presentation tribute (in VCD/DVD) to the late Gen. Florencio A. Medina, regarded as Father of Atomic Energy in the Philippines, during his birth centennial celebration on November 7; and (4) five posters about the PNRI research and regulatory activities and services for the Atomic Energy Week celebration exhibits in December 2005.

PNRI also participated in special events consisting of eight technology fairs; a scientific symposium on "Disaster Preparedness and Mitigation: S & T Prevention to Rehabilitation" during



Senator Francis N. Pangilinan, the NSTW Opening Ceremonies keynote speaker, views the PNRI-developed multimedia presentation on CD-ROM at the PNRI exhibit booth. Senator Pangilinan is joined by DOST Secretary Estrella F. Alabastro, PNRI Director Alumanda M. dela Rosa and a PNRI information officer.



A PNRI information officer discusses the characteristics of a product developed through radiation technology during a nuclear awareness seminar.

the National Science and Technology Week (NSTW) celebration in July; the Atomic Energy Week celebration; and school/university anniversaries and foundations. Linkages with the media were pursued through the following: 12 radio/television interviews; preparation and monitoring of news releases and radio spot announcements. The PNRI also conducted 21 nuclear awareness seminars in schools in Metro Manila and in four regions of the country.

Library Services

The PNRI Library was able to acquire 1,012 publications through donations and exchange with local and foreign institutions/agencies. The publications are composed mostly of books and journals on radiation physics and chemistry. These materials, together with other PNRI library holdings, were made available to around 2,005 researchers who availed themselves of the library services and facilities for the year.

To further expand its library holdings, the Institute continued to participate in the following: (1) Science and Technology Information Network of the Philippines (SciNET-PHIL), a network of S & T Libraries in the Department of Science and Technology (DOST) system, and (2) the Philippine e-library. This is a joint project of the DOST, the National Library, University of the Philippines, Department of Agriculture, and Commission on Higher Education.



DOST Undersecretary Prof. Fortunato dela Peña, Chairman of the DOST SciNET- PHIL Executive Committee, tries to access nuclear information from the e-lib portal during his visit at the PNRI Library.

NUCLEAR S & T TRAINING				
ON-THE-JOB TRAINING				
FIELD OF TRAINING	PNRI Unit	School	Course	No. of Students
X-ray Diffraction Studies of Aluminum-Doped Rare Earth Yttrium Garnets; Device-Fabrication for Thin-Film Coating on Solid Substrates	Applied Physics Research	PUP and UP Los Baños	BS Physics BS Applied Physics	8
Liquid Scintillation Spectrometry	Analytical Measurements Research	UP Visayas UP Diliman	BS Physics BS Chemistry	4
Environmental Monitoring of Naturally-Occurring Radioactive Materials (NORM)	Health Physics Research	TUP	BS Chemistry	3
Red Tide Sedimentation Studies: Lead-210 Dating and Water Chemistry	Chemistry Research	UP Visayas UP Diliman	BS Chemistry	4
Mutation Breeding and Nursery Management; Embryo Culture of Orchids and Other Agricultural Crops; and Fruit Fly Rearing	Agricultural Research	UP HS - Iloilo BSU and NEU	High School BS Biology	3 12
Amnion Processing; Microbiological Analysis of Food and Medical Products; Biochemistry; and Basic Molecular Techniques	Biomedical Research	UP Diliman; BSU; UST; NEU; Phil. Science High School	BS Chemistry, BS Biology, BS Microbiology High School	7 3
Radiation Dosimetry	Irradiation Services	TUP	BAS Lab. Tech	1
High Dose Dosimetry; Radiation Protection Operations; and Routine SSDL Procedure	Radiation Protection Services	PUP	BS Applied Physics	3
Production of Information Materials	Information Services	Arkicadd Cntr	Information Technology	1
Theoretical Physics	Nuclear Training Center	PUP	BS Physics	3
Electronics	Engineering Services	Mapua	BS Electrical Engineering	1
THESIS ADVISORSHIP				
In-vitro Digestibility Evaluation of Banana as Ruminant Feeds	Biomedical Research	TUP	BS Applied Physics	2
Competency Needs Assessment of the NRLSD/PNRI for Human Resource Devt.	Nuclear Training Center	Feati University	MS Management Engineering	1
Effects of Gamma Radiation In Vitro Culture on Protocorm Development of Dendrobium Pattaya Beauty	Agricultural Research	Univ. of Rizal Dela Salle-Araneta	BS Biology BS Agriculture	5

Generation of New Knowledge and Technologies

2005 AEW On-the-Spot
Poster Making Contest
2nd Place
Mary Grace delos Reyes
San Joaquin-Kalawaan High School
Pasig City



Basic Research

High Technology Materials Development

Preparation of Organic Thin Films.

Applied Physics research specialists at PNRI are currently undertaking research and development studies on thin films in the nanometer thickness regime. As part of these studies, carrageenan nano-films



Thickness measurement of carrageenan nano-size thin films using the x-ray reflectivity technique

coated on quartz substrate were produced using the spin-coating technique. The carrageenan films of thicknesses ranging from 20 to 133 nanometers (nm) were also characterized using the x-ray reflectivity technique. This was done by modifying a conventional vertical goniometer x-ray diffractometer. The carrageenan nano-films are envisioned to improve the surface of substrates for measurements of dissolved metals by total-reflection x-ray fluorescence, and later to serve as components of sensors for dissolved metals. The capacity of carrageenan for self-assembly and to form monolayers are being studied.

Study of the Gel Structure of Carrageenan by Mossbauer Spectrometry.

A study on the possible application of carrageenan as a matrix for arranging iron (Fe) nano particles in a specific arrangement has been initiated. For this study, a gel system of Fe⁺² and carrageenan was formed. The form of bonding of the Fe in the gel structure was also studied by Mossbauer effect using a cobalt-57 source and a constant acceleration Mossbauer spectrometer.

Interactions of Carrageenan with Radiation by Pulse Radiolysis

Pulse radiolysis of carrageenan was undertaken to support applied researches on the radiation processing of carrageenan. Pulse radiolysis is a method of initiating fast reactions to study reactions occurring on a timescale faster than approximately one hundred microseconds (one millionth of a second) when simple mixing of reagents is too slow and other methods of initiating reactions have to be used.

The rate constants of reactions of hydroxyl radical and solvated electron with kappa carrageenan were determined. The kinetics of the hydrated electron indicates no seeming reaction with kappa carrageenan. Hydroxyl radical reacts

very rapidly with kappa carrageenan at a rate constant of approximately $1.2 \times 10^9 \text{ M}^{-1}\text{s}^{-1}$. This rate constant varies with pH. It is faster at an acidic pH = 2 while slower at a basic pH = 12. Kappa carrageenan is known to undergo depolymerization resulting in reduced molecular weight with irradiation dose.

Kinetics of PSP Toxin Uptake in Mussel

The Institute is undertaking studies on the rate of uptake of paralytic shellfish poisoning (PSP) toxins in mussels under field conditions in Juag Lagoon in Matnog, Sorsogon. This lagoon has blooms of the algae producing the PSP toxins nearly every year. Results showed that even at very low cell density of the PSP-producing algae, the mussels that were exposed to the algae accumulated measurable levels of the PSP toxins.

To assist in understanding the uptake of saxitoxin (one of the PSP toxins) in mussels, saxitoxin is being labelled with radioactive carbon biosynthetically. The radiolabelled saxitoxin will be useful in understanding the fate and transport of saxitoxin in the marine food chain.

DOST Secretary Estrella F. Alabastro and Dr. Fauzi Mantoura, Director of the IAEA Marine Environment Laboratory in Monaco, unveil the marker designating the PNRI as an IAEA Collaborating Center for Studies on Harmful Algal Blooms. At left is PNRI Director Alumanda M. dela Rosa.



Based on the work currently being done in this project, the PNRI has been designated as IAEA Collaborating Center for Studies on Harmful Algal Blooms. The PNRI therefore has joined the ranks of six other select institutions throughout the world that have been designated as an IAEA Collaborating Center. In ceremonies that were timed with the opening of the Atomic Energy Week celebration in December, the marker officially recognizing PNRI as an IAEA Collaborating Center was unveiled.

Health and Medicine

Radiation Processing of Carrageenan and Other Natural Polymers

PVP-Carrageenan Hydrogel Wound Dressing. The polyvinyl pyrrolidone (PVP)-carrageenan hydrogel - a dressing for burns, wounds and bedsores - is now ready for commercialization. This product,

which was developed by PNRI through radiation technology, has already a pending patent application (#1-2000-02471) at the Philippine Patent Office. The PNRI has also completed the construction of a pilot plant at the Chemistry Research laboratory for the production of the hydrogel. A license agreement and non-disclosure agreement are likewise being negotiated with prospective adoptors who will do a market acceptability testing on the product in collaboration with PNRI. The adoptors will also have to secure the approval of the Bureau of Food and Drugs.

The PVP-carrageenan hydrogel is made from a water-soluble polymer (PVP) and seaweed polysaccharide (carrageenan). It is a fully permanent hydrogel in a form of transparent sheet, 3 to 4 mm thick, containing over 90 percent of water. The product is available in two sizes: 8 by 8 inches and 4 by 4 inches. The advantages of PVP-carrageenan hydrogel are: non-allergenic, soft, very effective in treating first and second degree burns, elastic but mechanically strong and cheaper by about 25 percent than commercial dressings.



PVP carrageenan has good physical and mechanical properties: safe, non-allergenic, elastic but mechanically strong.



PVP Chitosan Gels. The Urology Section under the University of Sto. Tomas Hospital's Department of Surgery has conducted animal studies of the PVP-chitosan injectible gel developed by PNRI through radiation technology. If the animal studies are successful, this gel would be a much cheaper alternative to the imported and expensive implant for the cure of primary vesicoureteral reflux (VUR). VUR is the most common urologic anomaly in children associated with urinary tract infection. It is a risk factor for progressive renal damage.

Development of Radiation Sterilized Honey as Wound Dressing

PNRI, in collaboration with the University of the Philippines in Los Baños, Laguna (under the BEE Program) is undertaking a comprehensive study on characterizing the physico-chemical and biological properties of home-grown honey as these relate to the potential application of honey as a biological wound dressing. Six types (three unifloral and three multi floral) of honey are being studied. Initial results showed that the unifloral honey has the most



Microbiological analysis of irradiated Philippine honey



PNRI Director Dr. Alumanda M. dela Rosa and a Health Physics Research staff listen to Dr. Franca Padoani as she discusses the operation of the radionuclide monitoring station in Tanay, Rizal during the inauguration of the monitoring station in December. Dr. Padoani is Chief, Radionuclide Monitoring Section, International Monitoring System of the Preparatory Commission of the CTBTO.



Establishment of CTBTO Monitoring Stations in the Philippines

The Philippines has beefed up its capability for monitoring radiation in the environment with the certification of the radiation monitoring station in Tanay, Rizal by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) Preparatory Commission. The monitoring station, named PHP 52 (RN52), will be operated and maintained by PNRI with financial assistance from CTBTO starting 2006. Through this station, air is collected daily using a very high volume air sampler and its radioactivity measured in a gamma ray detector system. The radiation data is transmitted continuously to the CTBTO International Data Center via VSAT (very small aperture terminal) for global monitoring of radiation in the environment.

With the certification of PHP 52 (RN52), and the two auxiliary seismic stations in Davao (AS 79) and Tagaytay (AS80), the Philippines has complied with its commitments under the Comprehensive Nuclear Test Ban Treaty. These stations are now part

antimicrobial property against the *S. aureus*, *M. luteus* and *P. vulgaris*. The honey samples tested have an average moisture content of 15 percent that is within the optimal water content to prevent fermentation, and a pH range of 3.9 to 4.0 that prevents microbial growth. These properties are not affected by 10 kGy of gamma radiation, which was the dose found to be effective in sterilizing the honey samples. The microbiological content and biochemical properties of home-grown honey will be studied next.

Environment

Receptor Binding Assay of Saxitoxin for Red Tide Monitoring

The facilities and manpower capabilities for doing the receptor binding assay (RBA) of saxitoxin has been established at the PNRI. Saxitoxin is one of the paralytic shellfish poisoning (PSP) toxins. In view of this accomplishment, the PNRI is now recognized as an IAEA/RCA Regional Resource Unit for RBA. The assay method is now being tested for routine monitoring of PSP toxins in red tide areas in cooperation with the Bureau of Fisheries and Aquatic Resources.

of the 321 global network of the International Monitoring System (IMS) that collect data on evidence of nuclear tests.

Radioactivity Measurement in the Environment

The PNRI, through its Health Physics Research Group, assessed the release of radioactive materials (radium-226 in particular) from phosphogypsum ponds leaching into the water system surrounding the PHILPHOS Fertilizer Plant in Isabel, Leyte. Phosphogypsum - a technologically enhanced naturally-occurring radioactive material (TENORM) - is considered a by-product in the production of phosphate fertilizer at PHILPHOS, LIDE in Isabel Leyte. The PNRI also measured the levels of radon-226 in both homes and working places using CR-39 alpha track detector. Data showed very low radium-226 concentration (0.001 to 0.09 becquerel per liter (Bq/L) in water from various sources such as seawater, spring water, artesian well water and ground water surrounding the industrial plant. At this concentration, exposure of the residents in Isabel, Leyte to radium-226 is below the limits set by US-EPA at 0.18 Bq/L. On the other hand, radon-222 is measured at 27 Bq/m³ in dwelling places; this is within the nationwide range of 2 to 67 Bq/m³ in Filipino homes.



Collection of water samples for radioactivity analysis

Air Pollution Source Apportionment

PNRI uses nuclear and related analytical techniques to obtain information on principal pollution sources which can be used as basis for enlightened air quality management policies. This year, the Institute's Analytical Measurements Research Group continued to collect air filter samples from its four monitoring stations in Metro Manila that resulted in augmentation of the database for fine and coarse particulate matter in the PM10 range. Data generated has indicated that the fine fraction is non-compliant to the United States Environmental Protection Agency (US-EPA) long-term standard for PM2.5. The data obtained was used as basis for formulating local standards for fine particulate matter. Analysis of filters was done at the PNRI by X-ray Fluorescence (XRF) spectrometry and at the Australian Nuclear Science and Technology Organization by Proton Induced X-Ray Emission spectrometry.

Pollution source apportionment was continued for the Ateneo de Manila University monitoring station. Results indicated the following major sources of particulate pollution: (1) the fine fraction is largely made up of products of various combustion processes while the coarse fraction is largely made up of soil; (2) a major contribution from vehicular emission is noted in the fine fraction; and (3) a plot of source contributions against wind direction indicated geographical location of sources.



Analysis of air filter samples using the KEVEX XRF system

Isotope Techniques in Water Resources Management and Protection

Davao City. Results of further PNRI studies on the application of isotope techniques in groundwater contamination indicated that the deep groundwater being tapped by the Davao City Water District (DCWD) to supply about 60 percent of the city's water requirement is recharged from a mixture of precipitation from higher elevation and more than 50 percent river water. The information obtained from these studies supported the results of a terrain analysis of the Mines and Geosciences Bureau (MGB), Region XI, which was conducted within the same period as the PNRI study. The results of these studies strengthened DCWD and MGB recommendation to the local government delineating the recharge areas and watershed areas for protection. These led to the adoption and implementation of management protection policy manifested by the passing of the City of Davao Executive Order No. 22, Series of 2005.

These information have also inspired the Department of Natural Resources Region XI to issue DENR Administrative Order 23 for the

adoption and implementation of a collaborative approach to watershed management in Region XI. Furthermore, this has resulted in more vigilance on the water supplier's end (DCWD) in monitoring the quality of water being supplied to the population.

Bacolod City. The PNRI has started to implement an IAEA Technical Cooperation project on the "Delineation of Recharge Zones for the Bacolod City Groundwater Systems" in collaboration with Bacolod City Water District (BACIWA). Bacolod City has been identified by the National Water Resources Board as one of the water critical urbanized areas in the Philippines. PNRI will undertake the establishment of benchmark isotope and chemical data that will be helpful in the assessment of water quality in Bacolod City at present and in the future.



Collection of water samples from monitoring wells in Bacolod City for isotopic and chemical analysis



Computer-aided generation of baseline radiation maps of Batan Island, Batanes province

Initial activities undertaken for this project were: (1) collection of water samples from 27 locations that include representative production wells of BACIWA, selected domestic wells, and surface water sources in the Bacolod City watershed; (2) chemical analyses at PNRI of the collected samples; (3) isotopic analyses at the Pakistan Institute of Nuclear Science and Technology; and (4) tritium dating of the samples at the IAEA Isotope Hydrology Laboratory in Vienna.

Rizal (Rodriguez and San Mateo).

Using isotopic and chemical techniques, PNRI researchers continued to study the possible threat of contamination from the Montalban sanitary landfill to the water resources in the area. From the chemical (major and trace) and isotopic characterization of the groundwater in San Mateo and Rodriguez municipalities, PNRI has generated baseline data that will be useful in assessing the effectiveness of leachate management and mitigation plans for the operation of the landfill.

Hydrogeochemical Process Studies/Environmental Surveillance

A natural radioactivity survey in Batan Islands, Batanes was completed using a portable gamma ray spectrometer. Radiation maps of the naturally-occurring radioactive elements uranium, thorium and potassium-40 were generated. These maps will complement the existing radiation map on the Batanes Island. The compiled data will serve as baseline levels should a nuclear incident/accident occur in neighboring countries that operate nuclear power plants.

Industry

Application of X-ray Spectroscopic Techniques

A portable radioisotope excited x-ray fluorescence (XRF) spectrometer was installed using a fabricated casing made of adjustable angle bars. A more compact XRF system is being designed. The set up will enable PNRI to conduct on-site measurements, e.g., nature and thickness of coating of jewelry items, element profile to determine origin and date of works of art and museum pieces.

Radiotracer and Sealed Sources Applications

The PNRI utilized a gamma-ray absorption technique to investigate the deposition of solids in the walls of pipelines of the Philippine National Oil Company (PNOC) geothermal plant in Tongonan,



PNRI uses a nuclear technique to measure deposition of solids in walls of pipelines at the geothermal facility in Tongonan, Leyte.

Leyte. The PNRI's Isotope Techniques Research Group conducted the following activities prior to the implementation of the service contract with PNOC: (1) development and fabrication of an adjustable pipe scanner, and (2) construction of a calibration line simulating field conditions for determining the different diameters of pipes and varying thicknesses of deposits and insulation of pipelines.

Agriculture

Mutation Breeding

Rice. PNRI agricultural researchers further screened mutants with improved characteristics from crosses of 12 radiation-induced mutant lines of rice planted at the PNRI experimental plots. The rice mutant lines were obtained from previous crosses of Japanese rice, Bengawan, Azmil, Denorado, IR8, and Azucena. The results showed that: the cross between Japanese rice and the PNRI-developed



Bengawan mutant had the highest number of grains and was the earliest to flower; and the tallest was the cross between Azmil and Bengawan mutant.

Soybean. The screening of drought tolerant mutants from the fourth and fifth generations of three irradiated soybean varieties from Vietnam and four Philippine varieties were undertaken by PNRI Agricultural Research specialists. This is in collaboration with the Bulacan Agricultural State College.

The following results were obtained for the local varieties: (1) significant difference in the number of drought tolerant plants among the varieties: BPI-Sy 4 had the highest number of drought tolerant plants followed by NSIC, PSB-Sy5 and PBS-Sy-4; (2) the number of days to flowering in all varieties irradiated with 200 and 250 Gy was not affected by irrigation withdrawals and treatments; and (3) PSB-Sy-4 that were irradiated with 250 Gy had the most number of early maturing plants, followed by BPI-Sy-4 that were exposed to the same dose.

The three varieties from Vietnam (namely DT-95, DT-84 and AK0-6) were also adapted to Philippine conditions. Among the mentioned varieties, DT-95 irradiated with 200 Gy gave the highest number of early maturing plants as compared with the control (unirradiated).

Mungbean and Groundnut

(Peanuts). Eighteen mungbean mutant varieties from Southeast Asian countries were planted at the Bulacan Agricultural State College in



Drought-tolerant plants from BPI-SY4 in the fifth generation

Original plant - *Cordyline terminalis* 'Itchy Red'Chlorophyll mutant - *Cordyline* 'Medina'

San Ildefonso, Bulacan for the third cycle of the Project on Regional Mungbean Mutants Multilocation Trials. The results showed that the variety NM51 x VC1973A from Pakistan was the highest seed yielder (0.86 tons per hectare).

For the second cycle of the Groundnut Regional Mutant Multilocation Trials in January, the PNRI planted nine varieties from Indonesia, Bangladesh, Vietnam and Sri Lanka. Results of the second cycle trials were as follows: (1) Binachina badam 1 mutant variety was the earliest to flower; (2) no mutant variety was identified as early maturing; (3) the varieties from Indonesia, B/30/12/10, and from Bangladesh, Binachina badam 2, had the biggest seed weight (51 grams per 100 seeds); and (4) the local check variety, NSIC PN-10, had the highest yield (825 kg/ha).

Cashew and Mangosteen.

Mutation breeding studies using gamma radiation, coupled with tissue culture technique, are being undertaken by PNRI to develop high-yielding, early-maturing and non-seasonal mutant varieties of high value crops, particularly cashew and

mangosteen. For this year, the PNRI agricultural research specialists utilized the tissue culture method for the propagation of these crops. More plantlets or seedlings were obtained from a single irradiated cashew and mangosteen explants with the tissue culture technique as compared with the conventional method of propagation.

Ornamentals. The Technical Working Group on Ornamentals endorsed to the National Seed Industry Council of the Bureau of Plant Industry the approval of registration of the PNRI cordyline chlorophyll mutant in December 2005. The mutant is named *Cordyline terminalis* 'Medina', in honor of the late Brig. Gen. Florencio A. Medina, the first Commissioner of the Philippine Atomic Energy Commission, precursor of PNRI. Gen. Medina is regarded as the Father of Atomic Energy in the Philippines. At least 500 plants were propagated and are ready for commercialization.

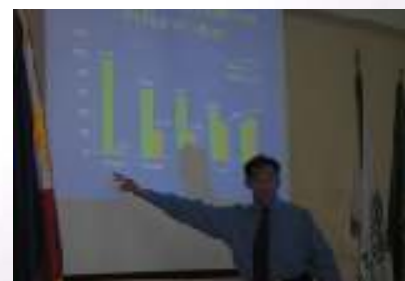
The other PNRI ornamental mutants, dwarf *Murraya* 'Ibarra Santos' and chlorophyll mutant *Dracaena* 'Marea' are being commercialized. Mutation

work on other ornamental plants (*Freycinetia*, *Cordyline*, chrysanthemum, bromeliads, and orchids) is on various stages of segregation and purification. PNRI also continued its research studies using gamma irradiation, coupled with tissue culture technique, to improve the characteristics of cutflower ornamentals like orchids and chrysanthemum.

Food Irradiation

In cooperation with PNRI and other agencies, the Bureau of Food and Drugs (BFAD) finalized the draft of the Implementing Guidelines of the Department of Health Administrative Order No. 152 "Prescribing Regulations for Irradiated Food". In preparation for the implementation of AO 152, the PNRI conducted a training course on food irradiation for 30 food regulators at BFAD. The PNRI also coordinated and facilitated the conduct of a seminar entitled "Consumers' Acceptance to Pay for Irradiated Food" at the Department of Agriculture.

This year, the United States Department of Agriculture approved the following PNRI research projects



Dr. Rodolfo M. Nayga from the Texas A & M University, USA, shares information at the seminar on Consumers' Acceptance to Pay for Irradiated Food during his visit to the Philippines.

under the program "Enhancing the Export Competitiveness of Philippine Mangoes": (1) Quality evaluation of Philippine Super Mangoes irradiated at maximum tolerable dose; (2) Establishment of radiation dose for quarantine treatment of mango pulp weevil, *Esternochaetus frigidus*, in Philippine Carabao mangoes; (3) Upgrading of pilot scale gamma irradiation facility; (4) and Advocacy program on food irradiation technology (Luzon and Visayas).

Soil Erosion Assessment in Agricultural Landscapes

The PNRI has been conducting studies on the redistribution/movement of soil in agricultural landscape with the use of a nuclear technique. The technique involves the measurement of cesium-137 in soil samples using a high purity Germanium detector. These measurements are then converted to estimates of soil erosion/sedimentation rates using calibration models.

This year, the PNRI, in collaboration with the Bureau of Soils and Water Management



Researchers from PNRI and BSWM brief farmers on the benefits of using organic-based farming.

(BSWM) conducted the studies in selected areas of Angat Watershed in Bulacan and the Inabanga Watershed in Bohol. For the Inabanga Watershed, data on the soil redistribution were collected and analyzed using available calibration models. Additional samples were collected in the latter part of the year to be able to get a more detailed soil redistribution profile within the area. Soil samples were also collected in the new study area in Angat, Bulacan for cesium-137 radioactivity content measurement. Soil quality parameters are also being evaluated in collaboration with the BSWM.



PNRI researchers mark sampling points for collection of soil samples in a new study area in Angat, Bulacan.

Efficiency of Fertilizer Nitrogen Use in Lowland Rice-Based Cropping System

PNRI researchers conducted a field experiment at a farmer cooperator's field in Talisay, Camarines Norte during the wet cropping season to test the efficacy in rice-based cropping system of two organic-inorganic fertilizer combinations obtained in previous PNRI studies utilizing nitrogen-15 tracer technique. These combinations consisted of the following: 1:2 rice straw compost plus inorganic fertilizer (ammonium sulfate); and 2:1 rice straw compost with inorganic fertilizer (ammonium sulfate). These were compared to that of the farmer's practice (1:3 combination of urea and 14-14-14) and that of using inorganic fertilizer only.

Initial results showed that the treatments using inorganic fertilizer only and that of farmer's practice are comparable to the two organic-inorganic combinations previously

obtained by PNRI. Further evaluation of the best fertilizer organic-inorganic fertilization will be assessed after the residual cropping season since most of the nitrogen coming from the organic source is not available or mineralized yet for plant uptake in the first crop planting during the wet cropping season.

Improving the Quality of Biofertilizer

The PNRI has been conducting research on improving the quality of biofertilizer using nuclear technology. The research involves the use of gamma irradiation for sterilization of the bio-fertilizer carrier. This process is expected to improve the quality of carrier by providing more nutrients and increasing growth of the inoculant.

This sterilization technique was tested in the carrier (soil and charcoal) of Bio-N, a biofertilizer which is capable of fixing atmospheric nitrogen and turning it into form usable by crops. The sterilization of Bio-N carrier was determined at a dose of 30 kGy. The effect of gamma irradiation on the properties of Bio-N carrier still needs to be confirmed and test on the efficacy of Bio-N with irradiated carrier to crop production (such as corn) will be conducted.



Fruit fly (*Bactrocera philippinensis*) mating test in field cages

Fruit Fly Control

As part of the sterile insect technique (SIT) program for controlling fruit fly population, the PNRI has started to undertake research studies related to two newly-approved projects funded by the International Atomic Energy Agency (IAEA). These are on the "Improvement of Mass-rearing Methods for *Bactrocera philippinensis* and the "Improvement of Sterile Male Performance of *B. philippinensis* for Sterile Insect Technique (SIT) Programs. The research projects involve: (1) evaluation and modification of existing technologies currently used to develop effective and low-cost procedures in insect handling for large-scale operation, and (2) manipulations of the emergence and release facilities in order to reduce cost and increase effectiveness of SIT programs.

PNRI Celebrates Centennial Birth Anniversary of Gen. Florencio A. Medina, "Father of Atomic Energy in the Philippines"



DOST Undersecretary Rogelio A. Panlasigui and PNRI Director Alumanda M. dela Rosa unveil the marker of the Gen Medina park.



Eulinia M. Valdezco, Chief of PNRI's Nuclear Regulations, Licensing and Safeguards Division and chairperson of Gen. Medina centennial birth anniversary celebration gives the opening remarks during the program at PNRI.



The PNRI celebrated a century's legacy of Gen. Florencio A. Medina, regarded as the Philippine Father of Atomic Energy, on November 7.

Gen. Medina is remembered for his pioneering work as Commissioner of the Philippine Atomic Energy Commission, the precursor of PNRI, and for his contributions in the peaceful use of nuclear technology during his subsequent stint at the International Atomic Energy Agency in Vienna, and at the National Science Development Board (NSDB), precursor of the Department of Science and Technology, which he was tasked to head.



Karen Medina-Jelinek and Kaulayaw Medina (second and third from left), youngest and eldest of Gen. Medina's 13 children, respectively, pose with PNRI Director Alumanda M. dela Rosa and DOST Undersecretary Rogelio A. Panlasigui after the wreath laying ceremony at the monument of Gen. Medina.



PNRI Agricultural Research Group head Avelina G. Lapade presents the PNRI-developed mutant variety *Cordylone* "Medina" to the Medina family and guests during the Gen. Medina park dedication ceremony.



Children, grandchildren and great grandchildren of Gen. Medina who are based in the Philippines and abroad arrived to help organize the affair and to be part of the celebration.

Guests view the memorabilia of Gen. Medina's life as a soldier, science administrator, scientist, educator, international civil servant and writer.



Provision of Quality S&T Services

2005 AEW On-the-Spot
Poster Making Contest
3rd Place
Ma. Charo Piñeda
Panghulo National High School
Malabon



Regulatory Services

Licensing Review and Evaluation

This year, PNRI issued a total of 306 radioactive material licenses (20 new, 43 amendment and 243 renewal) to government and private institutions/companies. A license is required to ensure that the activities involving the use of radioactive materials in industry, medicine, research and education are carried out in accordance with safety standards. Fourteen licensees were likewise issued termination of a license following a process set forth in the regulations. In addition, the PNRI issued 508 certifications for the Bureau of Customs to release imported radioactive materials to licensed suppliers.

Inspection and Enforcement

The PNRI, through its Inspection and Enforcement Section, conducted inspection and audit of 161 licensed radioactive materials and facilities. This was undertaken to determine compliance with PNRI rules and regulations including the specific conditions of the issued licenses. The PNRI inspectors reported that 27 percent of the inspected licensees complied with PNRI regulations and 43 percent implemented actions to correct the reported deficiencies based on inspection findings conducted by the regulatory staff. PNRI conducted follow-up inspections to 30 percent of licensees with pending non-compliance to verify the actions/responses undertaken to

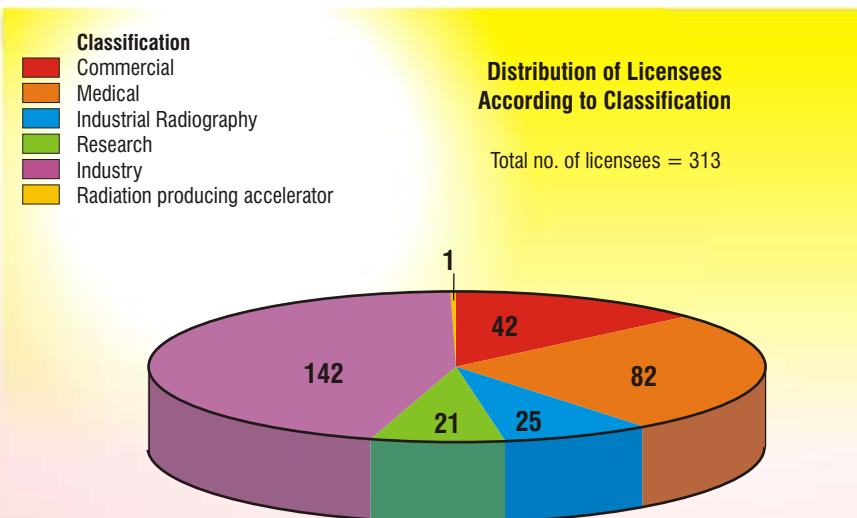


Radiation monitoring of a nuclear density gauge installed at thickener underflow line of Lepanto Consolidated Mining Corporation, a PNRI licensee

comply with the institutes regulations. Enforcement action in the form of "Cease and Desist Orders" and "Show Cause Orders" were served to three licensees for the temporary suspension/closure of operations.

This year, the PNRI issued a total of 2,330 "Authority to Transport" certificates to licensees for the transport of sealed radioactive materials to authorized locations in the country and for the shipment of disused sealed sources to foreign consignees.

PNRI also started a search and recovery activity for sealed sources that are vulnerable and may potentially become abandoned by its owners and licensees who have defaulted in their obligations to maintain valid licenses and have ceased to communicate with PNRI. Communications have been established with ten licensees.



Standards Development

To further enhance the safety in the use of radioactive materials in the country and to assist licensees in complying with regulatory requirements, the PNRI, through its Standards Development Section, published in the Official Gazette the following: (1) Administrative Order No. 4, S.2004, Amendment of CPR Part 3: Standards for Protection Against Radiation - Vol. 101, No. 3, 3 January 2005; (2) CPR Part 23: Licensing and Requirements for Land Disposal of Radioactive Waste- Vol. 101, No. 19, 9 May 2005; and (3) Revised CPR Part 13: Licenses for Medical Use of Radio-pharmaceuticals - Vol. 101, No. 52, 26 December 2005. CPR Part 21: Licensing and Safety Requirements of Particle Accelerator Facilities for the Production of Radioisotopes- Vol. 102, No. 2, will be published on 9 January 2006. The PNRI also approved for publication in the Official



DOST Secretary Estrella F. Alabastro and United States Charge d'Affaires Joseph A. Mussomeli pose with the officials of DOST, PNRI, Department of Foreign Affairs, Philippine Ports Authority and the US Embassy after the signing ceremonies of the memorandum of Intent (MOI) concerning cooperation to prevent the illicit trafficking in nuclear and other radioactive materials.

Gazette CPR Part 25: Licenses for Commercial Providers of Nuclear Technical Services in December 2005.

The PNRI introduced amendments to CPR Part 22, "Fees and Charges for Radioactive Material Licenses and Other Related Regulatory Services" to address the directive for increased revenues for government services. The drafts of the proposed CPR Part 17, "Licenses for Commercial Sale and Distribution of Radioactive Materials"; CPR Part 18, "Licenses for Use of Radioactive Materials in Research and Education"; and CPR Part 19, "Licenses for Use of Radioactive Materials-In Vitro Clinical and Laboratory" are in their final stages of development.

Safeguards and Security

The United States and Philippine governments signed an agreement on July 19 to install special equipment at the Manila South Harbor and the Manila International Container Terminal to detect illicit shipments of nuclear and other radioactive materials. This agreement is under the US Department of Energy-National Nuclear Security Administration Megaports Initiative. In November, the PNRI Safeguards Section participated in the preparations of the US Megaports Team for the final design requirements and concept of operations for the radiation monitoring systems at the port terminals.

The PNRI, through the Safeguards Section, also conducted the

following seminars and workshops on safety and security of radioactive materials in the Philippines:

(1) seminar to promote the ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management at the Department of Foreign Affairs; (2) National Awareness Seminar on Monitoring, Detecting and Identifying the Presence of Nuclear and Radioactive Materials and In-Transit at PNRI in cooperation with the International Atomic Energy Agency (IAEA); (3) National Design Basis Threat (DBT) Workshop as a follow-through to the IAEA DBT workshop held in 2004; and (4) a series of workshops about nuclear security plans for the Philippines. The results of the workshops were incorporated in the Integrated Security Plan which is being prepared for submission to the IAEA for support. These workshops and seminars were participated in by representatives from government agencies and organizations concerned with national security, intelligence, and defense.

Furthermore, the Safeguards Section oversaw the implementation and completion of the task orders pursuant to the US-DOE/Batelle-PNRI Project under the Radiological Threat Reduction (RTR) Program. These orders include the completion of physical protection/security upgrades and installation of alarm systems in the Radioactive Waste facility and Cobalt-60 irradiation facility at PNRI. The decommissioning of a teletherapy machine at the Davao Doctors Oncology Center, Inc. was also undertaken as part of the on-going

security upgrades in hospitals and other facilities utilizing high risk radioactive sources.

In compliance with the comprehensive safeguards agreement with the IAEA on the Non-Proliferation of Nuclear Weapons, the Philippines through PNRI, hosted a regular visit of the IAEA safeguards inspectors. The visit included the physical inventory verification of nuclear materials present and design verification at the Philippine Research Reactor-1.



Creating a simple compartmental model for radiological impact assessment using AMBER computer code

Radiological Impact Assessment

The PNRI, through the Radiological Impact Assessment (RIA) Section, assessed the radiological impact of the use of fly ash (found to contain higher than the average level of background radioactivity in the environment) for developmental construction by the Department of Public Works and Highways. Possible exposure scenarios via inhalation, ingestion and external potential exposure pathways including the projected consequences to a member of the general public were undertaken.

In support of the regulatory function of the PNRI, the RIA determined the health and environmental risks resulting from the reported loss of krypton-85 sources used for thickness gauging by a PNRI licensee. The RIA also accomplished the following: (1) reviewed and evaluated the proposed validation of the external dose resulting from the administration of therapeutic dose of iodine-131 to patients; (2) continued to provide comments on draft regulatory documents being developed by the Institute; and (3) updated the previously determined clearance level of radioactive materials for medical, industrial and research applications in the Philippines.

Radiological Emergency Planning and Preparedness

The PNRI, through the Radiological Impact Assessment (RIA) Section, closely coordinated the continuing effort to build the capability of the country to respond in the event of a radiation related emergency or a nuclear terrorist attack through the implementation of the National Radiological Emergency Preparedness and Response Plan (RADPLAN). As part of the RADPLAN, the RIA prepared a



PNRI emergency response team performs radiation monitoring for possible retrieval of lost radioactive sources of a PNRI licensee.

document that describes the roles and responsibilities of the RADPLAN participating agencies to respond in the event of terrorist use of radiological dispersal devices (RDDs) and the use of improvised nuclear devices (INDs). The RIA also continued linkages with the National Disaster Coordinating Council, Office of Civil Defense, Department of Health and other government agencies on matters relevant to emergency preparedness. The PNRI National Radiological Emergency Response Organization was reconstituted to ensure the timely and adequate response to any nuclear or radiological emergency in the country.

Radiological emergency planning and preparedness activities of the PNRI were strengthened with the operationalization of the PNRI Emergency Response Center. The coordination for the response of the PNRI, Department of the Interior and Local Government (DILG), Department of Science and Technology (DOST) and other local

government units and hospitals to recover missing radioactive sources of a PNRI licensee was likewise facilitated. The PNRI emergency response teams were activated and subsequently, search and recovery operations for the reported missing radioactive materials were conducted.

The country, through the PNRI, participated in four emergency exercises as part of its commitment under the Convention on Early Notification of a Nuclear Accident (Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention) of the International Atomic Energy Agency (IAEA). These were the ConvEx 1a held on February 2005, ConvEx 2a on April 2005, ConvEx-3 on May 2005 and the ConvEx 2a on October 2005. The communication exercises involved the ability to access the IAEA website and immediate exchange of needed information.

Site Selection and Conceptual Design of a Near Surface Radioactive Waste Repository in the Philippines

Under this project, the Radiological Impact Assessment (RIA) Section continuously implements a number of activities in close collaboration with other member agencies of the Subcommittee on Radioactive Waste Management like the Department of Environment and Natural Resources, Department of Energy, and the Department of Science and Technology.

For 2005, the following were accomplished: (1) completion of the technical evaluation and comparison of 10 candidate sites based on a pre-determined site evaluation criteria; (2) final analysis of the candidate sites which resulted in the shortlisting of the top three candidate sites. These sites will be further characterized using auger drilling techniques; (3) conduct of research and development activities in the areas

The Inter-agency Subcommittee meeting on radioactive waste management during the mission of Mr. Bernard Neerdael, IAEA Technical Officer of Technical Cooperation Project on Site Selection and Conceptual Design of a Near Surface Radioactive Waste Repository in the Philippines. (Inset) Actual survey in one of the proposed sites



of waste characterization, design and performance assessment of the proposed facility in parallel with the field studies; and (4) inventory of information on current waste and waste anticipated to arise in the future in support of the development of performance assessment methodology.

A repository concept adapted to the type of waste and associated radionuclide inventory has been proposed after the visit of joint expert missions from the International Atomic Energy Agency. Three types of design that can be co-located in one site have also been considered. These include (1) a classical multi-barrier surface repository from the most active low level wastes, (2) a trench type design for low-active concrete debris and other wastes from the dismantling of nuclear facilities; and (3) a borehole disposal concept for the spent sealed sources. A performance assessment based on generic site but with characteristics similar to the local environment is continuously being conducted for the groundwater scenarios.

Regulatory Infrastructure Support (RIS) Project

The Institute's Nuclear Regulations, Licensing and Safeguards Division started to review the relevant parts of the various Code of PNRI Regulations (CPR), specifically those relating to Category 1, 2 and 3 sources as a main priority activity, to ensure that security requirements are updated and consistent with the following: (1) the IAEA International Basic

Safety Standards-based CPR Part 3 "Standards for Protection Against Ionizing Radiation", (2) the IAEA Code of Conduct on the Safety and Security of Radioactive Sources, and (3) other IAEA guidance documents regarding source security, the categorization of sources, and import/export guidance. This review was undertaken pursuant to a Basic Ordering Agreement (BOA) between the PNRI and Batelle Memorial Institute, Pacific Northwest Division under the general framework of the United States - Department of Energy NNSA Radiological Threat Reduction Program. It is also intended to produce regulatory guides to provide concerned stakeholders more detailed information and guidance materials for compliance purposes for each of these revised CPRs.

In support of the RIS, the PNRI prepared the first draft of the Comprehensive Nuclear law which basically addresses the need to establish an independent regulatory body for ionizing radiation in the country. This was reviewed by an IAEA Mission on October 17, 2005.

Nuclear and Allied Services

Gamma Irradiation Services

The PNRI continued to offer gamma irradiation services to industry, the academe and other research institutions using the PNRI Multipurpose Irradiation Facility and the Gammacell-220.

At the Gammacell-220, a total of 1,981 samples from 23 clients (mostly students), were irradiated or exposed to gamma radiation for mutation breeding studies, disinfestation and for research purposes. The samples irradiated included the following: seeds of mangosteen, corn, palm and rice; ornamental plants/seeds/cuttings; banana corm/sucker; orchid cuttings/seeds/protocorms/fruits/pod; mungbean; chicken eggs, pumpkin anther, mushroom culture, rambutan, potatoes, pineapple crowns, onion bulbs, solo papaya; fruit fly pupae; fruit flies; mice; copper sulfate; and crop residues.



Spices contained in drums are being irradiated inside the Cobalt-60 Multipurpose Irradiation Facility for microbial decontamination.

RADIATION PROTECTION SERVICES - 2005

National film badge service	50,939 films issued 2,330 institutions served
Thermoluminescent dosimetry	4,200 TLDs issued 69 institutions served
Calibration of radiation detection/monitoring instruments	564 instruments calibrated 387 institutions
Leak testing of sealed radioactive sources	235 tests 58 institutions served
Area monitoring	342 monitoring services 3 facilities
Air monitoring	215 monitoring services 3 facilities
Radiological support	11 services 3 facilities
Swipe sample counting	318 units 73 institutions
Radioactive Waste Management Spent sealed sources	31 units 10 institutions served
Liquid waste, liters	70.24 liters 9 institutions served
Solid waste, cu.m.	1.33 cu.m. 9 institutions served
Rental of survey meter	53 units 46 institutions served

At the Multipurpose Irradiation Facility, a total of 6,798 samples from 43 clients were irradiated for decontamination, sterilization and research purposes. Products irradiated for industry included spices and dehydrated vegetables, frozen fruit nuts, cosmetic raw materials, frozen bone grafts, amnions, orthopedic implants, and plastic bags. For research, the following samples were irradiated: honey, hydrogel, hemostat, carrageenan, injectible gel, polyvinyl pyrrolidone(PVP) solution,

chitosan solution, virgin coconut oil and soybean oil, Bio-N substrate, mangoes, frozen seafood, tuna flakes, fish meal, anthurium plant, pineapple plants, petri dishes, pectin, chitin and cacao pods.

Radiation Protection Services

The PNRI provides radiation protection services to authorized users of radiation and radioactive materials in the country. The PNRI, through the Institute's Radiation Protection Services (RPS), renders the following services to ensure that exposure of workers occupationally exposed to radiation and the public are measured and controlled: (1) personnel monitoring of radiation exposures through the national film badge and thermoluminescent dosimetry services; (2) calibration of radiation detection instruments to ensure reliability and accuracy of radiation measurements; (3) leak testing of sealed radiation sources; (4) collection and management of disused radiation sources; and (5) other special services such as radiation hazards evaluation of radiation facilities.

In addition to these services, the RPS attended to the upgrading of the PNRI Radioactive Waste

Worker occupationally exposed to radiation wears personal dosimeters while measuring surface dose rate of containers with radioactive materials.



Management Facility which is being funded by the US-Department of Energy under the Radiological Threat Reduction (RTR) Program. Meetings and workshops were also hosted during the year. The FNCA Survey Meeting on TENORM (Technologically Enhanced Naturally-Occurring Radioactive Material) and Decommissioning Clearance was held at PNRI in August to promote a deeper understanding on the actual local situation on TENORM issues. The IAEA Regional Workshop for Planning of Waste Management Activities in East Asia was held at PNRI to discuss the regional and specific national needs that can be addressed by developing a regional project in the area of waste management, specifically, spent sealed source management.

Nuclear Based Analysis

Through the Analytical Measurements Research Group (AMRG) and the Applied Physics Research Group (APRG), the PNRI provided analytical services involving nuclear and related techniques to various clients. The AMRG analyzed a total of 531 samples from 41 clients using the following techniques: gammametric analysis and pelletization. The APRG analyzed various samples from 17 clients using X-ray fluorescence spectrometry. The samples analyzed were the following: water, fresh human blood, fresh human blood serum, human urine, Manila Bay sediments, packs of sand, diatomaceous earth, spool of gold wire, soil, metal and gemstones.

Computer Services

The Computer Services managed, maintained and improved the PNRI Local Area Network/Internet including the internet servers and the PNRI website. The group were also able to connect all PNRI units and facilities to the PNRI network and upgrade existing coaxial cable connection to fiber optic backbone.

The PNRI intranet was developed to aid the Institute in disseminating relevant information and electronically facilitate various services to its personnel through integrated systems such as content management, collaboration, knowledge management and electronic services.

The PNRI, through the Computer Services, continued its collaboration with other DOST agencies in connection with the project on Test Analyses and Calibration Information System (TACIS). TACIS aims to provide interactive services which immediately and efficiently addresses queries and concerns on testing, analysis and calibration services through the Internet.



A PNRI Computer Services staff performs local area network troubleshooting and maintenance to ensure continuous operation of PNRI's intranet and internet connections.



A locally-fabricated radiation survey meter which is cheaper than imported ones.

Engineering Services

The PNRI Engineering Services has completed the fabrication/production of six prototype radiation survey meters (three high range and three low range) using locally available components through financial assistance from the Technology Application and Promotion Institute-DOST. The Group, in cooperation with different companies and hospitals, has successfully tested the performance of these survey meters during the year.

The Engineering Services also completed a total of 111 jobs (50 major and 61 minor) on the repair and maintenance of nuclear instruments for PNRI and non-PNRI clients, mostly from the medical and industrial sectors. The Group also provided support in the decommissioning of a nuclear facility in Davao City.

Cytogenetic Analysis

The PNRI provided the following services to six clients: (1) cytogenetic analysis for four newborn babies/preschool children to confirm genetic defects such as Downs Syndrome and delayed mental ability; (2) radiological reassurance for two overseas workers occupationally exposed to radiation.

S & T Linking & Networking

The PNRI received a plaque of recognition from the Institute of Human Genetics (IHG), University of the Philippines in Manila, for its technical support and advocacy and promotion efforts for the IHG's Newborn Screening Program. The IAEA was also awarded on the same occasion with a plaque of appreciation for its technical and funding support to the program on neonatal screening.



Signing of Memorandum of Agreement on December 6, 2005, between the PNRI and Philippine Association for Radiation Protection, Inc. on the conduct of training courses for radiation protection and safety

PNRI Director is IAEA SAGTAC Chair

PNRI Director Alumanda M. dela Rosa has accepted the invitation of the IAEA Director General Mohamed ElBaradei to participate in the IAEA Standing Advisory Group on Technical Assistance and Cooperation (SAGTAC) as Chair until 2008. Dr. dela Rosa is the first woman to lead the committee as well as the first to come from a developing country.

LINKAGES

One of the priorities of PNRI is strengthening linkages with key players in the nuclear community.

The Philippines, through the PNRI, is a Member State of the International Atomic Energy Agency (IAEA), which was awarded in 2005 with the Nobel Peace Prize together with its head, Dr. Mohamed ElBaradei. Under the framework for Technical Cooperation of the IAEA, the PNRI takes active part in more than 50 regional, interregional and national projects on the peaceful uses of nuclear science and technology.

The PNRI continued its active partnerships with international organizations such as the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) for Asia and the Pacific; RCA Regional

Office (Korea); Forum for Nuclear Cooperation in Asia; Comprehensive Nuclear Test Ban Treaty Organization; and the Australian Nuclear Science and Technology Organization. Collaborative links that facilitate the transfer of technology information and expertise were likewise maintained such as those with the United States Department of Energy; United States Department of Agriculture; the Ministry of Science, Technology, Education, Culture and Sports of Japan; the Nuclear Safety Research Association of Japan; and the embassy of Argentina.

Ties with the local scientific community were also nurtured by involving the stakeholders in projects and cooperative researches on nuclear science and technology. Training opportunities were provided to a number of sectors to increase awareness and appreciation of the role that nuclear technology can play in various areas of endeavor.



PNRI Director Honored Among Women in Nuclear (WIN)

Dr. Alumanda M. dela Rosa is formally recognized internationally as among the distinguished "Women In Nuclear" who have contributed significantly to the peaceful use of nuclear technology. The World Nuclear Association (WNA) conferred the special honor on Dr. dela Rosa on September 8, 2005 at the Queen Elizabeth II Conference Center in London, on the occasion of the 30th Annual Symposium of the WNA.

Development of Human Resources for the S&T Sector

2005 AEW On-the-Spot
Poster Making Contest
5th Place
Lhanmar Cancilao
Eusebio High School
Pasig City



Internal

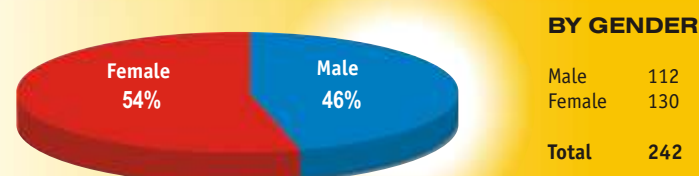
In pursuit of manpower development, the PNRI continues to support its staff to pursue graduate studies. For 2005, seven PNRI employees are availing graduate scholarships (5 MS degrees and 2 Ph.Ds) and another 13 on their own (8 MS/MA and 5 Ph.Ds).

Human resources development in the nuclear field was also emphasized. A total of 92 training activities (on-the-job training, scientific visits and attendance to training courses, workshops, seminars, meetings) were availed of by PNRI staff through the Institute's various linkages with international organizations and nuclear science and technology institutions in other countries.

External

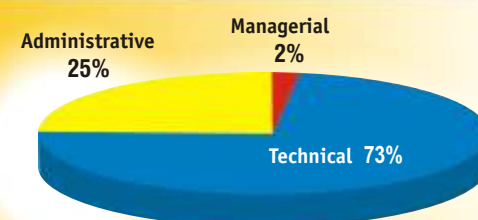
In the undergraduate level, 53 student-trainees were given on-the-job training and eight thesis dissertation assistance in the different units and research laboratories within PNRI. A total of 45 non-PNRI personnel availed of fellowship training, scientific visits, training courses, workshops, seminars and meetings. Six international events were also hosted by the Philippine Government through the PNRI.

DISTRIBUTION BY PERSONNEL

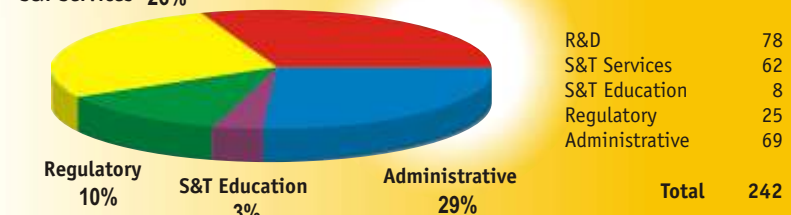


BY STAFF CATEGORY

Managerial	5
Technical	176
Administrative	61
Total	242

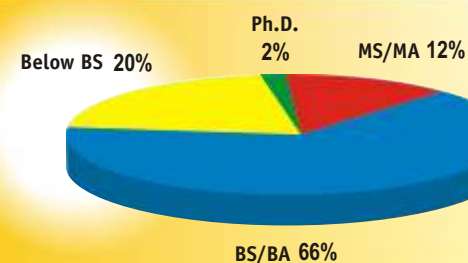


BY STAFF ACTIVITY



BY EDUCATION

Ph.D.	4
MS/MA	30
BS/BA	159
Below BS	49
Total	242



PNRI RECOGNITION AWARDS

Best Employee for 2005

- CERTIFICATE OF COMMENDATION for developing the PNRI Intranet, setting up the PNRI webmail and enhancing and maintaining the PNRI website through his web expertise



Christopher G. Halnin
Science Research Specialist II,
Nuclear Services and Training Division

Special Commendations

- CERTIFICATES OF RECOGNITION for exemplary performance of their duties (from left to right)

Luzviminda B. Muyco
Administrative Assistant III
Finance and Administrative Division

Preciosa Corazon B. Pabroa
Science Research Specialist II
Atomic Research Division

Gina D. Abrera
Administrative Aide VI
Atomic Research Division



Special Commendations

- CERTIFICATES OF RECOGNITION given to the **Fiber Optic LAN Group** for exemplary performance of the assigned task of installing the expansion of the fiber optic backbone of the PNRI Local Area Network

Ana Elena L. Conjares - Chairperson
Senior Science Research Specialist
Nuclear Services and Training Division (NSTD)

Members

1. Guiseppe O. Dean
Science Research Specialist I
Nuclear Regulations, Licensing and Safeguards Division
2. Arturo F. Salih
Senior Science Research Specialist, NSTD

3. Christopher G. Halnin
Science Research Specialist II, NSTD
4. Benjamin F. Mandinguido
Administrative Aide VI
Finance and Administrative Division (FAD)
5. Crisol P. Villanueva
Science Research Analyst, NSTD
6. Joseph R. Tugo
Administrative Assistant, NSTD
7. Michael Angelo F. Samson
Administrative Aide VI, FAD
8. Eduardo T. Cabildo
Senior Science Research Specialist, NSTD
9. Angel B. Anden
Senior Science Research Specialist, NSTD

Some members of the Fiber Optic LAN Group pose with DOST Assistant Secretary Mario P. Bravo (6th from left), PNRI Director Alumanda M. dela Rosa (5th from left), PNRI FAD Chief Graceta DL Cuevas (extreme left) and Linda L. Leopando, PNRI PRAISE Committee Chairperson (4th from left), during the AEW Awarding Ceremonies.



PNRI SERVICE AWARD

30 Years

(From left to right)
Angel B. Anden
Nydia C. Medina
Angeles M. Marcelo
Gloria R. Jimenez
Romeo M. Paradero
Lopito A. Caluag

(Not in photo)
Erlinda M. Bague
Elizabeth P. Cabildo
Teofilo V. Leonin, Jr.



The PNRI spearheaded the celebration of the 33rd Atomic Energy Week on December 5 to 9, 2005 at the PNRI compound along Commonwealth Avenue in Diliman, Quezon City.

The guiding theme for AEW 2005 celebration was “Sustainability Through Nuclear Science and Technology”.

Dr. Graceta de Leon-Cuevas, PNRI Finance and Administrative Division Chief and overall chairperson of AEW 2005 celebration gives her welcome remarks to the guests and visitors during the AEW opening ceremonies.



The AEW guests include Ambassadors Mario Schuff, Erendra Paz Campos and Navrekha Sharma of the embassies of Argentine Republic, Mexico and India, respectively; Raymond Chew, 1st Secretary of the embassy of Singapore; nuclear S & T experts and officials from Japan, Korea, and the International Atomic Energy Agency. Other guests are officials and staff from private and government institutes in the Philippines.



DOST Secretary Estrella F. Alabastro and Dr. Fauzi Mantoura, Director of Marine Environment of the International Atomic Energy Agency (IAEA), during the unveiling of the marker designating the PNRI as an IAEA Collaborating Center for Studies on Harmful Algal Blooms

The PHP 52 radionuclide monitoring station of the Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) in Tanay, Rizal was officially turned over to PNRI during the inauguration on December 8.

The VSAT antennae and the air sampler at the PHP 52 radionuclide monitoring station in Tanay, Rizal



DOST Secretary Estrella F. Alabastro, assisted by PNRI Director Alumanda M. dela Rosa, cuts the ceremonial ribbon to formally open the 2005 AEW exhibits.



TURN-OVER CEREMONIES OF THE RADIONUCLIDE MONITORING STATION

OPENING CEREMONIES

OPEN-HOUSE AND EXHIBITS



More than 4,000 visitors, composed mostly of students, were given guided tours to the PNRI laboratories and facilities during the AEW open-house celebration.



Dr. Augusto B. Santos, Socio-Economic and Planning Secretary and Director - General of National Economic Development Authority delivers his keynote address.



WELCOMING FORMER EMPLOYEES



A NIGHT AT PNRI

PNRI Director Alumanda M. dela Rosa joins employees on the dance floor



ON-THE-SPOT POSTER MAKING CONTEST



Sixty-two high school students from 46 public and private schools in Metro Manila participated in the on-the-spot poster making contest which was sponsored by the Quezon City Office of the Mayor. Rolie Florano, Jr. of Bagong Silangan High School, Quezon City won first place.



CLOSING/AWARDING CEREMONIES

TECHNICAL SESSIONS



The topics for the technical sessions were discussed by invited speakers from the IAEA, CTBTO, UNDP, US-DOE, RCARO and nuclear and scientific institutions in Belgium, Japan and the Philippines.



LECTURE-DEMO



The exhibit on the memorabilia of the late Brig. Gen. Florencio A. Medina, regarded as Father of Atomic Energy in the Philippines, was also viewed by AEW visitors.



Associate members of the Samahang Pisika ng Pilipinas and Physics students of UP-Diliman and Ateneo de Manila University conducted lecture-demonstrations on various physics concepts dubbed as “Physics in the City”.



S&T Special Events

PNRI Celebrates 33rd Atomic Energy Week

FINANCIAL STATEMENTS

STATEMENT OF FINANCIAL OPERATIONS

January to December 2005

	Allotment	Obligations Overdraft	Balance*
BUILT-IN APPROPRIATIONS			
General Administration and Support Services	Php 29,966,000.00	29,965,962.77	37.23
Support to Operations	1,711,000.00	1,711,000.00	0.00
Operations			
Nuclear Research Technology Development and Applications	25,545,000.00	25,544,987.96	12.04
Nuclear Services and Training	22,853,000.00	22,852,822.79	177.21
Nuclear Regulations, Licensing and Safeguards	10,586,000.00	10,585,990.00	10.00
SUBTOTAL	90,661,000.00	90,660,763.52	236.48
Automatic Appropriations			
Retirement & Life Insurance Premium	5,012,000.00	4,983,190.11	28,809.89
Continuing Appropriations*			
Use of Excess Income-Y2004	1,363,604.00	1,361,592.80	2,011.20
Budgetary Adjustment			
Terminal Leave Benefits Gratuity	1,523,089.00	1,523,089.00	0.00
Productivity Enhancement Pay	723,600.00	723,600.00	0.00
Educational Assistance	242,300.00	242,300.00	0.00
Performance Bonus	1,220,000.00	1,180,000.00	40,000.00
Use of Excess Income-Y2005	2,174,700.00	0.00	2,174,700.00
SUBTOTAL	5,883,689.00	3,668,989.00	2,214,700.00
GRAND TOTAL	Php 102,920,293.00	100,674,535.43	2,245,757.57*

*Continuing Appropriations for Y2006

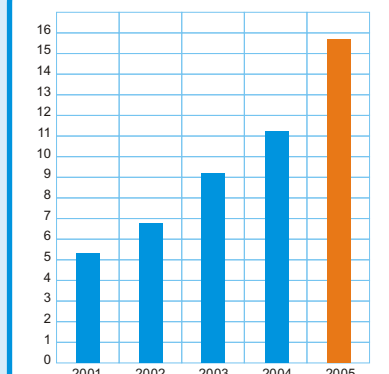
FINANCIAL STATEMENTS

STATEMENT OF ACTUAL INCOME

January to December 2005

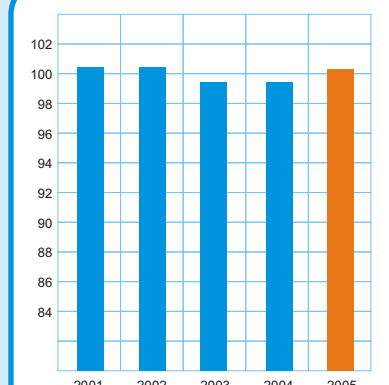
Nuclear Permits and Licenses	
Licensing fees, etc.	Php 1,282,836.75
Inspection fees	665,290.00
Fines and Penalties for Permits and Licenses	15,537.50
Subtotal	Php 1,963,664.25
Other Service Income	
Radioactive waste storage/disposal	121,000.00
Radiation protection services	
- Monitoring films, TLD badges and cassettes	10,100,160.30
- Calibration of radiation detection instruments	582,452.27
- Leak test of sealed radioactive sources / swipe tests for radioactive contamination	486,979.00
- Hazards evaluation service	97,000.00
- Radiation monitoring	4,380.00
Subtotal	Php 11,391,971.57
Nuclear-Based Analytical Services	
- Radioactivity analysis	942,670.00
- Qualitative X-ray fluorescence analysis	36,924.00
Subtotal	Php 979,594.00
Radioanalytical and Related Tests	
- Pipe scanning	75,000.00
- Mass determination of samples	19,635.00
- X-ray diffraction (XRD) data analysis	9,420.00
Subtotal	Php 104,055.00
Microbiological tests of tissue grafts/food and medical products	
Sale of sterilized amnion dressing	107,514.55
Cytogenetic analysis / Microscopy services	21,150.00
Use of Cobalt-60 Irradiation Facility	9,540.00
Subtotal	1,080,734.55
Other Business Income	
- Sale of Infopacs / tubing set / stickers / CPR	942,530.00
- Repair of instruments	13,790.00
- Sale of isotopes	9,200.00
- Rental fees (nuclear instruments)	99,830.00
Subtotal	57,300.00
Subtotal	Php 180,120.00
GRAND TOTAL	Php 15,700,139.37

INCOME



In the provision of quality S & T services for 2005, PNRI generated a total income of Php 15,700,139.37, which is 33.7% higher than the previous year's Php 11,735,317.02.

APPROPRIATIONS



appendices

TABLE 1. IAEA RESEARCH CONTRACTS¹

RESEARCH PROJECT	CHIEF INVESTIGATOR	AGENCY
• PSP Toxicity Risk Assessment: Accumulation and Elimination of Saxitoxin in Green Bay Mussels Using Nuclear Techniques	Elvira Z. Sombrito	PNRI
• Improvement of Mass Rearing Methods for <i>Bactrocera philippinensis</i>	Sotero S. Resilva	PNRI
• Development of Deletion Mutants of Tomato Hawaii 7996 for Resistance to <i>Ralstonia Solanacearum</i> and Other Important Traits by Targeted EMS and Irradiation Mutagenesis	Haydee Flandez - Galvez	Institute of Plant Breeding
• Selection of Greater Agronomic Water Use Efficiency in Rice for Salt Affected Areas Using Carbon Isotope Discrimination	Abdelbagi Ismael	International Rice Research Institute
• Quality Control of Pesticide Products	Ma. Esperanza Uy	Bureau of Plant Industry
• A Study on the Body Composition, Nutritional Status and Energy Expenditure of the Filipino Elderly	Gemma Yuchingtat	Food and Nutrition Research Institute
• Molecular Marker Techniques for Selection of Mutant Bananas with Improved Post-harvest Qualities	Emma Sales	University of Southern Mindanao
• Evaluation of a Simplified Method of Perfusion Only Lung Scan Compared to Standard V/Q and Spiral CT in Patients with Pulmonary Disease	Gerard Fabian Goco	St. Luke's Medical Center

TABLE 2. IAEA TECHNICAL COOPERATION PROJECTS²

RESEARCH PROJECT	COUNTERPART	AGENCY
• Human Resources Development and Nuclear Technology Support	Pilar C. Roceles Alumanda M. dela Rosa	PNRI
• Enhancing Agricultural Productivity Through Radiation Technology in Mindanao	Avelina G. Lapade Ma. Delia Morados Leocadio S. Sebastian	PNRI DOST XI – Davao City Philippine Rice Research Institute
• Nuclear Analytical Techniques for Evaluation of Airborne Pollution from Fossil Fuel-fired Power Plants	Flora L. Santos	PNRI
• Nuclear Analytical Techniques for Air Quality Management	Flora L. Santos Cesar Siador, Jr. Leni Quirit	PNRI Environmental Management Bureau University of the Philippines (UP)
• Isotope Applications in Improving Water Resources Management and Protection	Soledad S. Castañeda	PNRI
• Assessment of Erosion and Sedimentation Processes for Effective Formulation of Soil Conservation and Water Quality Protection Measures	Adelina dM. Bulos	PNRI
• Upgrading the Gamma Irradiation Facility	Estelita G. Cabalfin	PNRI
• Enhanced Nondestructive Testing Training	Estrella D. Relunia Percedita T. Cansino	PNRI
• Site Selection and Conceptual Design of a Near-Surface Disposal Facility	Ma. Visitacion B. Palattao	PNRI
• Neonatal Screening for Congenital Hypothyroidism	Carmencita D. Padilla Teofilo O.L. San Luis, Jr. Teresita Bonoan	UP – National Institute of Health Santo Tomas University Hospital Department of Health
• Gas Isotope Geochemistry for Geothermal Resources Management	Manuel S. Ogena	Philippine National Oil Company-Energy Development Center

TABLE 3. GRANTS-IN-AID FROM OTHER AGENCIES

PROJECT TITLE	PROJECT LEADER (PNRI)	FUNDING AGENCY
• Tests Analyses and Calibration Information System for DOST	Angel B. Anden	DOST
• Production of Radiolabelled Compounds for Receptor Binding Assay on Marine Biotoxins	Elvira Z. Sombrito	DOST
• Technology Transfer of Receptor Binding Assay to Regulatory Setting	Azucena C. De Vera	DOST
• Implication to Management Historical Profile of Harmful Algal Cysts and Anthopogeneic Inputs in Sediment Using Isotopic Techniques	Adelina dM. Bulos	DOST
• Manila Bay Environmental Management Project	Elvira Z. Sombrito	PEMSEA-International Maritime Organization
• Tracing Future Sustainable Paths Through Nuclear and Other Option	Christina A. Petrache	DOST
• Technologically - Enhanced Naturally Occurring Radioactive Materials (TENORM) Component II	Teofilo Y. Garcia	Philippine Phosphate Fertilizer (Philphos)
• Reproduction and Promotion of PNRI Multimedia Presentation in CD-ROM	Rhodora R. Leonin	Technology Application and Promotion Institute

TABLE 4. EXPERTS / MISSIONS

FIELD/PURPOSE	NAME	DATE
• Technical Assessment of Seismic Station, AS80 (CTBTO)	Carl Ebeling	7 – 9 March '05
• Megaports Initiative Program	David Huizenga	7 March '05
• Radiation Emergency Medicine	Dr. Akashi and H. Tatsuzaki	15 – 16 March '05
• Soil Erosion Project	Claude Bernard	21 - 23 March '05
• Nuclear Knowledge Management	Lans Ulfkjaer Hubert Ley	5 – 8 April '05
• Overall Assessment of the Newborn Screening Program	Prof. Jean Louis Dhondt	18 – 22 April '05
• United States – Department of Agriculture	Ned Cardenas	27 April '05
• Technical Officer for the Project “Site Selection and Conceptual Design of a Near-Surface Disposal Facility”	Bernard Neerdael	29 April – 5 May '05
• Radioactive Waste Management	Vladimir Kurghinyan	9 – 11 May '05
• Station Site Visit of RN52 (CTBTO)	Cecilia de Vera	30 – 31 May '05
• Regional Security of Radioactive Sources	Allan Murray Celia Hacker Mark Alexander Rick Rawls Don Wentz Dennis Wester	24 – 29 July '05
• Evaluation Mission for the Red Tide Project	Dalibor Kysela Katsumi Hirose	15 – 19 Aug '05
• RCA Regional Office – Promotion of Visibility and Viability	Carlito Aleta	22 – 26 Aug '05
• Review of Ongoing Technical Cooperation Projects and Upstream Work for 2007-2008	Reyad Kamel	22 – 26 Aug '05
• Training for RN52 Station Operators (CTBTO)	Jukka Lehtinen	13 – 16 Sept '05
• Radiological Characterization for the Philippine Research Reactor-I	Dennis Reisenweaver Christopher Clement Milijana Steljic	19 – 23 Sept '05
• Safety Assessment for Radioactive Waste Disposal Facilities	Matthew Kozak	27 Sept – 2 Oct '05
• Seafood Safety	Ross Jeffrey	3 – 7 Oct '05
• Certification Visit of RN52 (CTBTO)	Cecilia de Vera and Herbert Gohla	10 – 14 Oct '05

¹Research Contracts are grants under the IAEA Research Contract Programme whose funding is sourced from the IAEA regular budget and also from extrabudgetary contributions to the IAEA. Through this program, minor equipment and miscellaneous local purchases are provided. The grant to a project is of the average of U.S. \$5,000.00 per year.

²Technical Cooperation Projects are under the IAEA Technical Cooperation Programme and are funded by the Technical Assistance Committee Fund (TACF) and the extrabudgetary contributions to the IAEA. Financial support is provided in the form of three components, namely, expert assistance, equipment donation and overseas training.

TABLE 4. EXPERTS / MISSIONS		
FIELD/PURPOSE	NAME	DATE
• Development of National Nuclear Law	Carl Stoiber and George Philip	17 – 21 Oct '05
• Decommissioning / Radioactive Waste / Nuclear Power	Yutaka Kawakami	30 Oct – 24 Dec '05
• Safeguards Inspection	J. Plumb and D. Stritzke	24 Nov '05
• Model Projects 2007 - 2008	Sujit Dey	21 – 25 Nov '05
• Nondestructive Testing	Dr. Isaac Einav	23 June '05
• Radiological Risks: The ICRP 2005 Recommendations	Dr. Edward A. Christman	7 July '05
• United States Department of Energy (US-DOE) Mission	Anne Kohnen Jim Kaibei D. Rutherford	15 – 19 Aug '05
• FNCA Mission	Prof. Toshiso Kosako Dr. Takeshi Imoto Dr. Hidenori Yonehana Dr. Tsutomu Ishigama Mr. Shinichi Fukuda	15 Aug '05
• Design and Safety Evaluation, Hydrogeological Data Assimilation and Modelling	Matej Gedeon and Dirk Mallants	5 – 9 Dec '05
• Nuclear Power - NSRA Experts	Dr. Ishikawa Takeda	6 – 8 Dec '05
• CTBTO Turnover Ceremonies	Franca Padoani	6 – 10 Dec '05
• Farm Residue Management Strategies	Graeme John Blair	15 –16 Dec. '05
• United States - Department of Energy Mission	Donald Kovacic and Linda Hansen	12 – 16 Dec '05

TABLE 5. PNRI HOSTINGS					
FIELD	PHILIPPINE PARTICIPANT	AGENCY/INSTITUTE	ORGANIZER	VENUE	DATE
• IAEA/RCA Final Project Review Meeting on “Restoration of Soil Fertility and Sustenance of Agricultural Productivity - Measuring Soil Erosion/Sedimentation and Associated Pesticide Contamination” and IAEA/RCA Project Formulation Meeting on “Development of Sustainable Land Use and Management Strategies for Controlling Soil Erosion and Improving Water Quality”	Elvira Z. Sombrito Adelina dM. Bulos Richard M. Balog	PNRI	IAEA and PNRI	Holiday Inn / Manila Galleria	14 – 19 March '05
• 1st Regional Coordinator’s Meeting on Development of Mass Rearing for New World and Asian Fruit Fly Pests	Sotero S. Resilva	PNRI	IAEA and PNRI	PNRI	28 March – 1 April '05
• Project Coordinators’ Meeting on Nondestructive Testing (NDT)	Renato T. Bañaga	PNRI	IAEA and PNRI	PNRI	20 – 23 June '05
• Planning and Coordination Meeting on Sustainable Technologies for Managing Radioactive Waste	Eulinia M. Valdezco Editha A. Marcelo	PNRI	IAEA and PNRI	PNRI	22 – 26 Aug '05
• Regional Meeting on Strategies for Outreach to End-Users, Funding Agencies and Customers	Grace M. Carlos Justina S. Cerbolles Chitho P. Feliciano Raymond J. Sucgang Luzviminda L. Venida	PNRI	IAEA and PNRI	PNRI	3 – 7 Oct '05
• Regional Training Course on Authorization and Inspection of Radiation Sources in Radiotherapy	Thelma P. Artificio Lynette B. Cayabo Myrna E. Piquero Giuseppe Filam O. Dean Gladys Cabrera	PNRI Bureau of Health Devices & Technology -Dept. Of Health	IAEA and PNRI	Holiday Inn, Manila Galleria	14 – 25 Nov '05

TABLE 6. PLACEMENTS FOR FELLOWSHIP/SCIENTIFIC VISIT TO THE PHILIPPINES					
FIELD	NAME	AGENCY/INSTITUTE	PLACE OF FELLOWSHIP	DATE	SPONSOR
ON-THE-JOB TRAINING					
• Insect Pest Control	Nadeem Ahseek	Mauritius	PNRI	17 Oct – 25 Nov '05	IAEA
• Groundwater Hydrology	Muhammad Rafiq	PINSTECH, Pakistan	PNOC - Energy Development Center	9 March – 7 April '05	IAEA

TABLE 7. NON-PNRI MANPOWER DEVELOPMENT (FOREIGN)					
FIELD	NAME	AGENCY	VENUE	DATE	SPONSOR
ON-THE-JOB TRAINING					
• Newborn Screening	Ma. Rita Yumena	University of Sto. Tomas Hospital	Australia	2 May – 1 July '05	IAEA
• Soil and Water Management and Crop Nutrition	Celso Bersabe	Bureau of Soil and Water Management	Thailand	1 June – 31 Aug '05	IAEA
• Radioactive Waste Management Technologies	Mario Juan Aurelio	Mines and Geosciences Bureau	Hungary	29 Aug – 19 Oct '05	IAEA
TRAINING COURSE					
• Tracing Future Sustainable Paths Through Nuclear and Other Energy Options	Manolo Peña Rosalinda Codillo	PCIERD- DOST Department of Energy	Korea	7 – 18 March '05 8 – 12 Nov '05	IAEA
• Radionuclide Treatment of Liver Cancer	Eddie Lim	St. Luke's Medical Center	Pakistan	2 – 6 May '05	IAEA
• Physical and Technical Aspects in Radiotherapy	Candy Cruz Merle Sintos	Baguio Gen. Hospital Rizal Medical Center	USA	6 – 17 June '05	IAEA
• Brachytherapy in the Comprehensive Management of Lung Cancer	Erwin Q. Vito Cruz Johanna Patricia Canal	Jose R. Reyes Memorial Medical Center Philippine General Hospital	Japan	20 – 24 June '05	IAEA
• Clean Water and Air	Gerardo Parco	University of the Philippines	China	27 June – 1 July '05	IAEA
• Programme Management	Orestes Monzon	Philippine Heart Center	Australia	5 – 8 Sept '05	IAEA
• Radiation Protection and Safety in Diagnostic and Interventional Radiology	Virginia Bembo Marvin Tamana	Philippine General Hospital Philippine Heart Center	Kuwait	17 – 28 Sept '05	IAEA
• Repository Design Construction and Operation	Carlo Arcilla	UP- National Institute for Geological Science	Switzerland	19 – 30 Sept '05	IAEA
• Positron Emission Computed Tomography	Cecelia Caro Joselito dela Cruz Gerard Goco	St. Luke's Medical Center	Japan	3 – 7 Oct '05	IAEA
• Isotope and Geochemical Modeling on Groundwater Contamination	Rosindo Almonte Cynthia Iblan	Davao City Water District Manila Water Co. Inc.	India	3 – 14 Oct '05	IAEA
• Nuclear Power Policy, Planning and Project Management	Mario Libiran	Department of Energy	Korea	13 Oct – 2 Nov '05	KOICA/IAEA
• Experimental Advanced Course (6) – On-Site Inspection and Introductory Course	Esmeralda Banganan	Philippine Institute of Volcanology	Slovak Republic	24 – 28 Oct '05	CTBTO

TABLE 7. NON-PNRI MANPOWER DEVELOPMENT (FOREIGN)

FIELD	NAME	AGENCY	VENUE	DATE	SPONSOR
MEETING/ WORKSHOP/SEMINAR/SYMPOSIUM					
• International Seminar on Nuclear Safety: Course on Radiation Applications	Nathaniel B. de Vera	St. Luke's Medical Center	Japan	17 – 28 Jan '05	MEXT/RADA
• Final Coordination Meeting on "Preparation of Reference Materials for Proficiency Test Rounds"	Teresita Portugal	Food and Nutrition Research Institute	Pretoria, South Africa	24 – 28 Jan '05	IAEA
• Consultant's Meeting and Validation Workshop – Distance Education in Radiation Oncology	Gaudencio Vega Lorelei Chavez Faigha Bagis Michael Martin Malabanan	Philippine General Hospital Makati Medical Center	Malaysia	31 Jan – 5 Feb '05	IAEA
• Project Planning and ESTRO Symposium on Improvement in Quality of Radiotherapy for Frequent Cancers in the Region	Miriam Joy Calaguas	St. Luke's Medical Center	India	28 Feb – 9 March '05	IAEA
• Project Coordinators' Meeting to Discuss Automation and Harmonization of Immunodiagnostics for Strengthening Expansion of Newborn Screening Program	Carmencita Padilla Juanita Basilio	UP National Institute of Health Department of Health	Vietnam	20 – 23 March '05	IAEA
• Project Planning Meeting on Tumor Imaging Using Radioisotopes	Jerry Obaldo	Philippine Heart Center	Japan	4 – 7 April '05	IAEA
• Coordinators' Meeting for Establishing National Capabilities for Response to a Radiological and Nuclear Emergency	Neri G. Amparo	Office of Civil Defense	Vietnam	6 – 10 June '05	IAEA
• Project Coordinators' Meeting - Emphasis on Drug Resistance in Tuberculosis	Ma. Lourdes Galvez	Research Institute for Tropical Medicine	China	13 – 17 June '05	IAEA
• Project Coordinators' Meeting on Preventing Osteoporosis and Promoting Bone Mass in Asian Populations Using a Food –Based Approach	Aida Mallillin	Food and Nutrition Research Institute	Singapore	11 – 15 July '05	IAEA
• Coordinators' Meeting for Strengthening Radiological Protection of Patients and Medical Exposure Control	Bayani San Juan	Bureau of Health Devices and Technology	Dubai, UAE	16 – 20 July '05	IAEA
• Regional Meeting of Policy Makers on Overcoming Barriers to Sustainability of National Nuclear Institutions	Rogelio A. Panlasigui	Department of Science and Technology	Malaysia	25 – 29 July '05	IAEA
• 2nd Regional Coordinators' Meeting on Assessment of Total Energy Expenditure and Body Composition for Older Adult Subjects with Different Lifestyles	Gemma Yuchingtat	Food and Nutrition Research Institute	Guatemala	24 – 28 Oct '05	IAEA
EXPERT TEAM MISSION / SCIENTIFIC VISIT					
• Expert Team Mission to Conduct Comprehensive Clinical Quality Audit in Radiotherapy	Miriam Joy Calaguas	St. Luke's Medical Center	Mongolia	26 – 30 Sept '05	IAEA
• Scientific Visit - Groundwater Hydrology	Godofredo Barroca Fidel See Francis Edward Bayon	Philippine National Oil Company -Energy Development Center	Italy	7 – 19 Nov '05	IAEA
NON DEGREE COURSE					
• 4th Post-Graduate Educational Course on Radiation Protection and Safety of Radiation Sources	Timothy Joseph Tomas	Rizal Medical Center	Malaysia	01 June' 04 – 20 May '05	IAEA

TABLE 8. PNRI MANPOWER DEVELOPMENT (FOREIGN)

FIELD	NAME	COUNTRY	DATE	SPONSOR
ON-THE-JOB TRAINING				
• Somatic Embryogenesis	Ana Marie S. Veluz	Italy	3 Jan – 30 May '05	IAEA
• Radioecology	Ma. Celestina V. Honrado	Monaco	15 March – 14 July '05	IAEA
• Analytical and Instrumental Techniques	Raymond J. Sucgang	Germany	30 May – 29 July '05	IAEA
TRAINING COURSE				
• Information Communication Technology – Based Training Tools for Nuclear Instrumentation	Sofronio O. Enriquez Denis dC. Aquino	Vietnam	21 – 25 Feb '05	IAEA
• Understanding and Defining the Market for Products and Services	Luvimina G. Lanuza Ma. Celerina M. Ramiro	Indonesia	14 – 19 March '05	IAEA
• Information Course on Safety / Performance Assessment Modelling	Ma. Visitacion B. Palattao	Belgium	14 – 25 March '05	IAEA
• Introductory Course for Station Operators and National Data Center Managers	Teofilo Y. Garcia	Austria	18 – 22 Apr '05	CTBTO
• Technical Training Programme for Radionuclide Station Operators	Teofilo Y. Garcia	Austria	25 – 29 Apr '05	CTBTO
• Implementation of State Systems of Accounting and Control (SSAC) of Nuclear Materials	Sylvia S. Busine	USA	12 – 20 May '05	IAEA
• Recyclable Radiation Processed Polymer Products	Lorna S. Relleve Haydee M. Solomon	Vietnam	9 – 13 May '05	IAEA
• Sustainable Land Use and Management Strategies for Controlling Soil Erosion and Improving Soil and Water Quality	Richard M. Balog	China	9 – 20 May '05	IAEA
• Molecular Marker Techniques for Mutant Characterization	Mary Jane C. Manrique	Korea	13 – 24 June '05	IAEA
• Radiation Safety of Irradiator Plants	Gonzalo G. Madera Luzviminda L. Venida	Malaysia	18 – 22 July '05	IAEA
• Regional Training Course of Regulators on Authorization and Inspection of Cyclotron Facilities	Corazon M. Garcia Edgar G. Racho Teresita G. de Jesus Rosita R. Daroy	Singapore	8 – 12 Aug '05	IAEA
• Radioactive Waste Management Registry	Edittha A. Marcelo	Austria	8 –12 Aug '05	IAEA
• Physical Protection of Radioactive Sources	Teofilo Y. Garcia Nelson P. Badinas Giuseppe Filam O. Dean	Australia	29 Aug – 1 Sept '05	IAEA
• Use of Receptor Models in the Development of Air Quality Management Strategies	Corazon Preciosa Pabroa	China	12 – 16 Sept'05	IAEA
• Introductory Training - Interdiction of Weapons of Mass Destruction	Julietta E. Seguis	USA	4 – 7 Oct '05	US DOE
• Training Needs Assessment, Networking and Materials for Training Courses in Nuclear Safety	Roel A. Loteriña	France	10 – 21 Oct '05	IAEA
• Application of PGNA and Radioisotope Techniques for Exploration and Exploitation of Oil and Gas and Solid Mineral Resources	Denis dL. Aquino	China	24 Oct – 4 Nov '05	IAEA
• National Data Center Technical Staff	Lorna Jean H. Palad	Australia	21 – 25 Nov '05	CTBTO
• Computer (Project Manager for E-Government Promotion)	Ana Elena L. Conjares	Japan	15 Dec '05 – 1 April '06	JICA
• Train-the-Trainers Course on Application of the International Requirements and Guidance on Developing a National Capability Response to Radiation Emergency	Teofilo V. Leonin, Jr.	Iran	17 – 21 Dec '05	IAEA

TABLE 8. PNRI MANPOWER DEVELOPMENT (FOREIGN)				
FIELD	NAME	COUNTRY	DATE	SPONSOR
WORKSHOP				
• FNCA 2004 Workshop on Utilization of Research Reactors: Sub Workshop on Tc-99m Generator Technology	Adelina dM. Bulos	Thailand	13 – 20 Jan '05	MEXT
• FNCA Workshop on Utilization of Research Reactors	Flora L. Santos	Thailand	13 – 21 Jan '05	MEXT
• FNCA Workshop on Biotechnology	Richard M. Balog	Vietnam	24 – 28 Jan '05	MEXT
• Regional Workshop on Search, Location Identification, Securing and Disposition of Orphan Radioactive Sources	Eulinia M. Valdezco Julietta E. Seguis	Australia	21 – 25 Feb '05	IAEA
• Regional Workshop on Development of a Web Portal for the ASEAN Network for Education in Nuclear Technology	Corazon C. Bernido Christopher G. Halnin	Korea	21 – 25 March '05	IAEA
• FNCA 2005 Workshop on Nuclear Safety Culture	Vangeline K. Parami	Indonesia	6 – 10 June '05	MEXT
• Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific- Regional Office in Korea (RCARO)	Alumanda M. dela Rosa	Korea	7 – 9 June '05	RCA
• 2005 FNCA Workshop on Utilization of Research Reactors	Flora L. Santos Elvira Z. Sombrito	Malaysia	8 – 12 Aug '05	FNCA/MEXT
• 2005 FNCA Workshop on Human Resources Development	Estelita G. Cabalfin	Vietnam	13 – 16 Sept '05	FNCA
• Integrated Safety Evaluation	Alumanda M. dela Rosa Corazon C. Bernido	Austria	19 – 21 Sept '05	IAEA
• FNCA 2005 Workshop on Radioactive Waste Management	Eulinia M. Valdezco Editha A. Marcelo	Japan	26 Sept – 1 Oct '05	FNCA/MEXT
• FNCA 2005 Workshop for the Project on Application of Electron Accelerator	Lorna S. Relleve	Korea	14 – 18 Nov '05	FNCA/MEXT
• Regional Asia-Pacific Workshop on Water in Agriculture, Use of Isotopes and Nuclear Techniques to Improve Water Management for Sustainable Agriculture	Soledad S. Castañeda	China	21– 23 Nov '05	FAO / IAEA
• FNCA 2005 Workshop on Mutation Breeding	Avelina G. Lapade	Malaysia	5 – 9 Dec '05	FNCA/MEXT
• Final Project Review Meeting on Repair and Refurbishment of Nuclear instruments: Phase II	Eduardo T. Cabildo	Malaysia	5 – 9 Dec '05	IAEA
• Train-the-Trainers Workshop - Developing a National Capability for Responses to Radiological Emergency	Eulinia M. Valdezco	Austria	12 – 16 Dec '05	IAEA
SEMINAR				
• International Seminar on Nuclear Safety 2005: Course on Operation and Maintenance of Nuclear Facilities	Graceta DL. Cuevas	Japan	26 Sept – 7 Oct '05	MEXT /RADA
• International Seminar on Nuclear Safety 2005: Course on Radiation Applications	Aurelio L. Maningas	Japan	7 – 18 Nov '05	MEXT/RADA
MEETING				
• Technical Meeting for Supporting Staff in the Office of National RCA Representatives on E-Meeting Biotechnology	Mylene M. Espinal	Malaysia	17 – 21 Jan '05	IAEA
• Progress Planning Meeting on Tracing Future Sustainable Paths Through Nuclear and Other Energy Options	Christina A. Petrache	Pakistan	14 – 18 Feb '05	IAEA
• National Project Coordinators' Meeting to Assess the Progress of the Project on the Application of Isotope Technique for Groundwater Contamination Studies in Urbanized and Industrialized Areas	Soledad S. Castañeda	Thailand	21– 25 Feb '05	IAEA

TABLE 8. PNRI MANPOWER DEVELOPMENT (FOREIGN)				
FIELD	NAME	COUNTRY	DATE	SPONSOR
• Final Project Review Meeting on Application of Food Irradiation for Food Security, Safety and Trade	Zenaida M. de Guzman	Korea	21– 25 Feb'05	IAEA
• 6th FNCA Coordinators Meeting	Alumanda M. Dela Rosa Corazon C. Bernido	Japan	30 – 31 March '05	MEXT
• National Representatives Meeting; 7th RCARO Advisory Committee Meeting	Alumanda M. dela Rosa	Malaysia	3 – 8 Apr '05	Partially, Phil. Gov't
• Project Coordinators' Meeting on Integrated Approach for Improving Livestock Production Using Indigenous Resources	Celia O. Asaad	China	4 – 8 April ' 05	IAEA
• Executive Meeting on Air Pollution Related to Transboundary Effects, Visibility, Climate Change and Agriculture	Flora L. Santos	Australia	5 – 7 April '05	IAEA
• 18th Meeting on Radiation Safety Standards Committee	Eulinia M. Valdezco	Austria	25 – 28 April '05	IAEA
• Asian Nuclear Safety Network (ANSN) Topical Group Meeting on Safety Analysis	Carl M. Nohay	Korea	26 – 29 April '05	IAEA
• Consultancy Meeting of Information Technology Support Group	Angel B. Anden	China	27 – 29 April '05	IAEA
• Technical Meeting of Specialists on New Techniques in Sealed Sources and Radiotracer Preparation, Injection and Data Logging	Ma. Luz M. Ascaño	Pakistan	9 –13 May '05	IAEA
• Regional Meeting for National Planning, Selection and Design of IAEA TC Projects	Virginia S. Calix Nydia C. Medina	Myanmar	9 – 13 May '05	IAEA
• 4th Coordinators Meeting for the Incident Reporting System for Research Reactors	Eulinia M. Valdezco	Korea	16 – 20 May '05	Korea
• 2nd Steering Committee Meeting on Asian Nuclear Safety Network	Corazon C. Bernido	Korea	18 – 20 May '05	IAEA
• 2nd Regional Cooperation Meeting: Nuclear Applications to Determine Bioaccumulation Parameters and Processes Used for Establishing Coastal Zone Monitoring and Management Criteria	Elvira Z. Sombrito	Monaco	24 – 27 May '05	IAEA
• 1st Meeting of the 4th Sagtac (Standing Advisory Group for Technical Assistance and Cooperation)	Alumanda M. dela Rosa	Austria	30 May – 3 June '05	IAEA
• Coordinators Meeting for Establishing National Capabilities for Response to a Radiological and Nuclear Emergency	Teofilo V. Leonin, Jr.	Vietnam	6 – 10 June '05	IAEA
• Technical Meeting on Sterilization of Carrier by Irradiation for Biofertilizer	Richard M. Balog	Japan	20 – 22 June '05	FNCA/MEXT
• Coordination Meeting on Strengthening Radiological Protection of Patients and Medical Exposure Control	Vangeline K. Parami	United Arab Emirates	16 – 20 July 05	IAEA
• Regional Meeting of Policy Makers on Overcoming Barriers to Sustainability of Nuclear Institutions	Alumanda M. dela Rosa	Malaysia	25 – 29 July '05	IAEA
• Technical Meeting on Harmonization of Regional Nondestructive Testing (NDT) Applying ISO17024	Renato T. Bañaga	Sri Lanka	15 – 19 Aug '05	IAEA
• Technical Meeting /Workshop on Managing Nuclear Knowledge	Corazon C. Bernido	Italy	22 – 26 Aug '05	IAEA
• Meeting for World Nuclear Association (WNA) Support for Women in the Nuclear Profession (Recipient of Award)	Alumanda M. dela Rosa	London, UK	7 – 8 Sept '05	WNA
• FNCA Project Leaders Meeting for Public Information on Nuclear Energy	Rhodora R. Leonin	Japan	12 – 15 Sep '05	FNCA/MEXT
• Regional Technical Meeting for Additional Protocol Implementation	Julietta E. Seguis	Australia	10 – 14 Oct '05	ANSTO
• Final Project Meeting on Enhancing the Sustain-ability of the Marine Environment (Component 3)	Elvira Z. Sombrito	Australia	17 – 20 Oct '05	IAEA

TABLE 8. PNRI MANPOWER DEVELOPMENT (FOREIGN)

FIELD	NAME	COUNTRY	DATE	SPONSOR
• Technical Meeting on Asian Network for Education in Nuclear Technology (Anent)	Corazon C. Bernido	Vietnam	26 – 28 Oct '05	IAEA
• Technical Meeting on Handling, Conditioning and Storage of Disused Sealed Radioactive Sources	Eulinia M. Valdezco	Austria	28 Nov – 2 Dec '05	IAEA
• Project Coordinators' Meeting on Environmental Radiation Monitoring ad Regional Database	Eliza B. Enriquez	Bangladesh	28 – 30 Nov '05	IAEA
• FNCA Senior Officials' Meeting and Ministerial Level Meeting	Alumanda M. dela Rosa Victoria Fe O. Medina	Japan	30 Nov – 2 Dec '05	FNCA/MEXT
• Technical Meeting; Steering Committee Meeting to Review Progress and Future Activities of the EBP on the Safety of Nuclear Installations; Meeting of the Asian Nuclear Safety Network	Corazon C. Bernido	Austria	1 – 8 Dec '05	IAEA
• Technical Meeting to Promote the Ratification of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	Ma. Visitacion B. Palattao	Vietnam	15 – 16 Dec '05	IAEA
CONFERENCE / SYMPOSIUM				
• Conference on Nuclear Power for the 21st Century	Alumanda M. dela Rosa	France	21 – 22 March '05	IAEA
• Symposium on Uranium Production and Raw Materials for the Nuclear Fuel Cycle Supply and Demand, Economics, the Environment and Energy Security	Rolando Y. Reyes	Austria	20 – 24 June '05	IAEA
• Conference on Safety and Security of Radioactive Sources: Towards a Global System for the Continuous Control of Sources Throughout Their Life	Alumanda M. dela Rosa Julietta E. Seguis	France	27 June – 1 July '05	IAEA
• Conference to Consider and Adopt Proposed Amendments to the Convention on the Physical Protection of Nuclear Materials	Alumanda M. dela Rosa Julietta E. Seguis	Austria	4 – 8 July '05	IAEA
• 34th RCA General Conference; 49th IAEA General Conference; Senior Regulators Meeting	Alumanda M. dela Rosa	Austria	23 – 27 Sept '05	IAEA
• Conference on Safety of Radioactive Waste Disposal	Eulinia M. Valdezco	Japan	3 – 7 Oct '05	IAEA
• Conference on Operational Safety Performance in Nuclear Installations	Christina A. Petrache	Austria	30 Nov – 2 Dec '05	IAEA
SCIENTIFIC VISIT				
• Mass Rearing and Sterilization of Fruit Fly	Sotero S. Resilva	Thailand	21 Feb– 4 March '05	IAEA
• Safety Analysis / Performance Assessment	Ma. Visitacion B. Palattao Carl M. Nohay	Spain	23 Oct – 4 Nov '05	IAEA
• Quality Assurance of a Radioactive Waste Management Facility	Editha A. Marcelo	Australia	31 Oct – 11 Nov '05	IAEA
• Soil and Water Management Crop Nutrition	Adelina dM. Bulos	Australia & China	4 – 16 Dec '05	IAEA
EXPERT ASSIGNMENT / MISSION / CONSULTANCY				
• Mission - Evaluation of Agency's Technical Cooperation Programme in Kazakhstan	Alumanda M. dela Rosa	Kazakhstan	14 – 20 March '05	IAEA
• Expert Mission on Receptor Bending Assay	Azucena C. de Vera	Thailand	23 May – 3 June '05	IAEA
• Consultancy (to advise on the TECDOC on Implementation of Management Systems for Operating Organizations of Research Reactors)	Corazon C. Bernido	Austria	10 – 14 Oct '05	IAEA
• Expert Mission on Receptor Bending Assay for Paralytic Shellfish Quantification	Azucena C. de Vera	Vietnam	5 - 10 Sept '05	IAEA
RESEARCHERS EXCHANGE PROGRAM				
• Dose Assessment for Industrial Utilization of Naturally-Occurring Radioactive Material (NORM)	Vangeline K. Parami	Japan	11 Sept – 10 Dec '05	MEXT
DEGREE COURSE				
• Master's Degree Program: Nuclear and Quantum Engineering	Michael Dennis Fernandez	Korea	25 Feb. '05 – 24 Feb '06	RCA/KAIST
• PhD Program - RONPAKU Fellow Dissertation Program Under the 2005 Japan Society for the Promotion of Science (JSPS)	Lucille V. Abad	Japan	4 Sept '05 – 2 Dec '05	JSPS

TABLE 9. PNRI MANPOWER DEVELOPMENT (LOCAL)

FIELD	NAME	VENUE	DATE
TRAINING COURSE			
• Training Session on Chemical, Biological, Radiological and Nuclear (CBRN) Response Techniques	Corazon C. Bernido Osroxzon L. Amparo Christina A. Petrache	National Defense College of the Philippines	3 – 4 March '05
• Public Health Emergency Management in Asia and the Pacific PHEMAP Course	Erlinda S. Natera	Pasay City	2 – 3 May '05
• Training on Human Resource Management Information System	Alicia F. Lagunzad Joan B. Lenon	Advanced Science and Technology Institute	10 Nov '05
SEMINAR / WORKSHOP			
• Test Analysis and Calibration Information System at DOST (TACIS) SAD Workshop	Angel B. Anden	DOST	27 Jan & 11 Feb '05
• Two-Day Workshop on Redrafting of the Proposed Hazardous and Radioactive Wastes Management Act	Eulinia M. Valdezco	San Mateo, Rizal	9 – 10 March '05
• Nuclear Awareness Seminar on Monitoring, Detecting and Identifying the Presence of Nuclear and Radioactive Materials at Borders and In-transit	Osroxzon L. Amparo, Corazon M. Garcia Ma. Visitacion B. Palattao Edgar G. Racho Nelson P. Badinas	PNRI	11– 14 Apr '05
• Seminar on 5S of Good Housekeeping	Alan Flores, Salvacion O. Dean, Mary Rose Q. Mundo, Elizabeth T. Cabildo, Guiseppe Filam O. Dean, Theresa B. Deyto, Marife R. Roa, Johnylen V. Melendez, Luzviminda L. Venida, Alfonse A. Singayen, Teresita G. de Jesus, Josefina G. Natera, Jennylyn C. Minglana, Ruth B. Alicer	Philippine Trade and Training Center	17 May '05
• Two-day Live out National Environmental Health Action Planning (NEHAP) Workshop	Eulinia M. Valdezco	Quezon City	9 Sept '05
• Product Awareness Seminar	Angel B. Anden Conrado M. de Guzman	Hotel Galleria	20 Sept '05
• Product Awareness Seminar	Angel B. Anden	SM Megamall	7 Oct '05
• Seminar/Workshop on Environmental Management System/ISO 14001:2004 Standard	Soledad S. Castañeda Luvimina G. Lanuza	Metals Industry Research and Development Center - DOST	18 – 19 Oct '05
MEETING			
• Technical Working Group Meeting on Radioactive Waste Management Technologies	Estrella S. Caseria	Industrial Technology Development Institute - DOST	2 – 3 March '05
• 3rd PRGINET National Partners Meeting (NPM)	Angel B. Anden Ana Elena L. Conjares	PHIVOLCS	26 May '05
• DOST SciNET-PHIL Execom Meeting	Isabel M. Amsicaray	Science and Technology Information Institute	7 June'05
• Meeting –Workshop on Doses in Diagnostic Procedures in Nuclear Medicine	Eulinia M. Valdezco Thelma P. Artificio	Philippine Heart Center	12 Nov '05
SYMPOSIUM / FORUM			
• 6th Diliman Governance Forum (DGF) on Combating Corruption in the Philippines: Are we Plundering our Chances, or Doin' it Better ?	Grace DL. Cuevas Emma L. Cancino Alma S. Piñera Neil R. Guillermo	UP Diliman	16 March '05
• Symposium and Workshop on Nurturing Science Culture	Justina S. Cerbolles	UP Diliman	2 Sept '05

TABLE 9. PNRI MANPOWER DEVELOPMENT (LOCAL)			
FIELD	NAME	VENUE	DATE
CONVENTION / CONGRESS / CONFERENCE			
• 20th Philippine Chemistry Congress	Soledad S. Castañeda Socrates P. Cañete Lucille V. Abad	Baguio City	11 – 13 April '05
• DOST-Wide Planning Conference	Emma L. Cancino, Alicia F. Lagunzad, Neil R. Guillermo, Marilyn L. Castillo	STII	17 May '05
• Mid-year Convention Cum Seminar	Alma S. Piñera	Malate	1 July '05
• Attendance to the 2005 National Public Sector Labor-Management Congress	Graceta DL Cuevas Alicia F. Lagunzad Neil Raymund D. Guillermo	Social Security System, Quezon City	22 Sept '05
• 3rd National Convention on Health Emergency Management	Eulinia M. Valdezco Teofilo V. Leonin, Jr.	Manila	5 – 7 Dec '05
DEGREE COURSE			
• M.S. Degree in Management Engineering	Renato T. Bañaga	FEATI University	2005
• M.S. Degree in Environmental Science	Efren J. Sta. Maria	University of the Philippines-Diliman	2005
• Master's Degree in National Security Administration	Rolando Y. Reyes (Awarded Bronze Medal for Academic Excellence)	National Defense College of the Philippines	August 2005

LIST OF ABBREVIATIONS			
ANSTO	• Australian Nuclear Science and Technology Organization	NEU	• New Era University
BSU	• Batangas State University	NSRA	• Nuclear Safety Research Association, Japan
CTBTO	• Comprehensive Nuclear-Test-Ban Treaty Organization	PCIERD	• Philippine Council for Industry and Energy Research and Development
DOST	• Department of Science and Technology	PHILPHOS	• Philippine Phosphate Fertilizer
EBP	• Extrabudgetary Programme	PHIVOLCS	• Philippine Institute of Volcanology and Seismology
FAO	• Food and Agriculture Organization	PUP	• Polytechnic University of the Philippines
FNCA	• Forum for Nuclear Cooperation in Asia	RADA	• Radiation Application Development Association, Japan
IAEA	• International Atomic Energy Agency	RCA	• Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific
ICRP	• International Commission on Radiological Protection	RCARO	• RCA Regional Office in Korea
IMO	• International Maritime Organization	TUP	• Technological University of the Philippines
JICA	• Japan International Cooperation Agency	UP	• University of the Philippines
JSPS	• Japan Society for the Promotion of Science	UP-HS	• University of the Philippines-High School
KAIST	• Korea Atomic Institute of Science and Technology	US-DOE	• United States Department of Energy
KOICA	• Korea International Cooperation Agency	US-EPA	• United States Environmental Protection Agency
MEXT	• Ministry of Education, Culture, Sports, Science and Technology, Japan		

TABLE 10. LIST OF TECHNICAL PAPERS	
PAPERS PUBLISHED	
Abad, Lucille V., I. R. Nasimava, Charito T. Aranilla and M. Shibayama. "Light Scattering Studies of irradiated K- and I- Carrageenan". Radiation Physics and Chemistry, 73, 29-37 (2005).	Cabalfin, Estelita G., and Luvimina G. Lanuza, "Prospects of Radiation Treatment of Wastewater in the Philippines". Paper presented at the FNCA 2005 Workshop on Application of Electron Accelerator, Daejeon, Korea, 14-18 November 2005.
Azanza, R.V., Alumanda M. dela Rosa, Elvira Z. Sombrito, L. Cruz, E.P. Siringan, M. McGlone, G. Jacinto, C. Villanoy and J. Duyanen. "Harmful Algal Bloom Management Lessons from a Multidisciplinary Research Program in Manila Bay, Philippines". Recent Advances in the Prevention and Management of HAB in the South China Sea, K.C. Ho, S.H. Lu, T.S. Yu and K.F. Wong (Eds) 2005.	Cuevas, Graceta DL. "Operation, Maintenance, Inspection and Cutrent State of the Philippine Research Reacto". Paper presented at the International Seminar on Nuclear Safety 2005: Operation and Maintenance of Nuclear Facilities Course. Radiation Application Association (RADA), Tokai-mura, Japan, September 26 - October 7, 2005.
De Jesus, Teresita, G. "A Study on the Human Resource Development (HRD) Program in Nondestructive Testing (NDT) in the Philippines". The Nucleus, Volume XXXIII, 2005. pp. 29 – 32.	Cuevas, Graceta DL. "Nuclear and Radiation Safety Training Courses". Paper presented at the International Seminar on Nuclear Safety 2005: Operation and Maintenance of Nuclear Facilities Course. Radiation Application Association (RADA), Tokai-mura, Japan, September 26 - October 7, 2005.
Petrache, Christina A., Gabriel P. Santos, Jr., Lourdes G. Fernandez, Marilyn K. Castillo, Estrellita U. Tabora, Socorro P. Intoy and Rolando Y. Reyes. "The Recovery of Rare Earth Elements (REE) from Beach Sands". The Nucleus, Volume XXXIII, 2005. pp. 21 – 28.	De Guzman, Zenaida M.. "National Regulations on Food Irradiation". Paper presented during the 44th Annual Convention of the Philippine Association of Food Technologies, Inc., Crowne Plaza Galleria, Manila, 23 – 25 November 2005.
Solomon, Haydee M. and Takuji Kojima. "Development of PVB Film for Low-Dose Dosimetry in Radiation Processing". The Nucleus, Volume XXXIII, 2005. pp. 16 – 20.	Feliciano, Chitho P, Zenaida M. de Guzman, Cleofas Cervancia, Analinda Fajardo and Mitos Levelyn M. Tolentino. "Antimicrobial Activity of Radiation-Sterilized Philippine Honey". Paper presented during the 11th Beenet Conference and Techno-Fora, Ecotech Center, Cebu City, 20 – 22 May 2005.
Valdezco, Eulinia M., Ma. Visitacion B. Palattao, Carl M. Nohay, Raquel E. Grijaldo and Luzviminda L. Venida - "Development of a Low Level Radioactive Waste Repository in the Philippines". IAEA-CN-135-83, included in the book of contributed papers for the International Conference on the Safety of Radioactive Waste Disposal, Tokyo, Japan, 4 - 7 October 2005.	Lanuza, Luvimina G., and Ma.Celerina M. Ramiro, "Business Plan for the PNRI Gamma Irradiation Services". Presented at the IAEA Regional Training Course on Understanding and Defining the Market for Products and Services, Jakarta, Indonesia, 15-18 March 2005.
PUBLISHED AS TECHNICAL NOTES	
Cayabo, Lynette B., and Vangeline K. Parami. "The New IAEA Categorization of Radioactive Sources and Its Possible Improvement on PNRI Regulatory Effectiveness". The Nucleus, Volume XXXIII, 2005. pp. 36 – 42.	Leonin, Teofilo Jr. V., " National Capabilities for Response to Radiological and Nuclear Emergencies in the Philippines". Country report presented in the Regional Coordination Meeting for Emergency Response, Hanoi, Vietnam , 6-10 June 2005.
David, Jocelyn L., Thelma P. Artificio, Justina S. Cerbolles, Estrella S. Caseria, and Inocencio A. Agron. "Industrial Radiography in the Philippines: Safety Concerns". The Nucleus, Volume XXXIII, 2005. pp. 43- 47.	Solomon, Haydee M., "The PNRI Multipurpose Irradiation Facility". Presented at the Regional Training Course on Recyclable Radiation Processed Polymeric Products, Ho Chi Minh, 9-13 May 2005.
Racho, Edgar G., Luzviminda L. Venida, Ma. Visitacion B. Palattao, Jesus R. Perez and Carl M. Nohay. "Performance Audit and Testing of Fume Hoods in Nuclear Medicine Laboratories". The Nucleus, Volume XXXIII, 2005. pp. 33– 35.	Sombrito, Elvira Z., Estelita G. Cabalfin, Virginia S. Calix, Alumanda M. dela Rosa, Ma. Teresa L. Borras and Adelina dM. Bulos. "A Draft Business Plan for the Production of PZC ^{99m} Mo- ^{99m} Tc Generator in the Philippines". Paper presented during the 2005 FNCA Workshop on the Utilization of Research Reactors", Malaysia, August 2005.
PAPERS PRESENTED	
Abad, Lucille V., Lorna S. Relleve, Charito T. Aranilla, Alumanda M. dela Rosa, I. Nasimova, G. Okabe and M. Shibaya. "Structure and Dynamics of Irradited Carrageenan". Paper presented during the 20th Philippine Chemistry Congress. Baguio City, 11–13 April 2005.	Sombrito, Elvira Z., Merriam C. Tangonan, Ma. Celestina V. Honrado, Azucena C. de Vera, Ryan U. Olivares, Efren F. Sta. Maria and S. Tabbada. "PSP Toxicity Risk Assessment Accumulation and Elimination of Saxitoxin in Green Bay Mussels (<i>Perna veridis</i>) Using Nuclear Techniques". Progress Report presented during the CRP Meeting, Monaco, June 2005.
Barrida, Adelaida C., Avelina G. Lapade, Alfonso O. Grafia and J.C. Manuguit. "Drought Tolerance of Soybean (<i>Glycine max</i> L.) In the Philippines". Paper presented at the FNCA 2005 Mutation Breeding Workshop, Legend Hotel, Kuala Lumpur, Malaysia. November 2005.	Sombrito, Elvira Z., Adelina M. Bulos, Richard M. Balog, C. Rosales, Efren F. Sta Maria, Dante Margate. " Application of Cs-137 Tracer Technique in Soil Redistribution Studies in the Philippines". Final report presented during the Final Regional Meeting of IAEA RAS5039, Manila, March 2005.
Bernido, Corazon C. "Nuclear Science and Technology in Higher Education in the Philippines." Paper presented at the Technical Meeting on Asian Network for Education in Nuclear Technology (ANENT), 26-28 October 2005, Hanoi, Vietnam.	Valdezco, Eulinia M. and Ma. Visitacion B. Palattao, "Safety Assessment Approach for a Near Surface Disposal Facility In the Philippines". Presented at the FNCA Annual Meeting in Japan, 26-30 September 2005.
Bernido, Corazon C., Ana Elena L. Conjares, Christopher G. Halnin, and Angel Anden. "Knowledge Management Initiatives at PNRI." Paper presented at the Technical Meeting/Workshop on Managing Nuclear Knowledge, 22-26 August 2005, Trieste, Italy.	Valdezco, Eulinia M. and Ma Visitacion B. Palattao, "Clearance of Materials from Medical, Industrial and Research Application of Radioisotopes in the Philippines". Paper presented during the FNCA Task Group on NORM/TENORM and Decommissioning Clearance, PNRI, Quezon City, 8-12 August 2005.

PNRI OFFICIALS



EULINIA M. VALDEZCO, MSc

Chief
Nuclear Regulations,
Licensing
and Safeguards
Division

emvaldezco@pnri.dost.gov.ph
Tel. (632) 920-8796
(632) 929-6010 up to 19
local 244

CORAZON C. BERNIDO, Ph.D.

Deputy Director

ccbernido@pnri.dost.gov.ph
Tel. (632) 920-8741
(632) 929-6010 up to 19
local 222

ALUMANDA M. Dela ROSA, Ph.D.

Director

amdelarosa@pnri.dost.gov.ph
Tel. (632) 929-4719
(632) 929-6010 up to 19
local 221 or 287

VIRGINIA S. CALIX, MSc

Chief
Atomic Research
Division

vscalix@pnri.dost.gov.ph
Tel. (632) 920-8765
(632) 929-6010 up to 19
local 228

ESTELITA G. CABALFIN, MSc

Officer-In-Charge
Nuclear Services and
Training Division

egcabalfin@pnri.dost.gov.ph
Tel. (632) 920-8784
(632) 929-6010 up to 19
local 229

GRACETA DL. CUEVAS, DPA

Chief
Finance and
Administrative
Division

gdlcuevas@pnri.dost.gov.ph
Tel. (632) 920-8746
(632) 929-6010 up to 19
local 223

PNRI ORGANIZATION

